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AUGUST 28, 1937

ELECTRICAL WORLD

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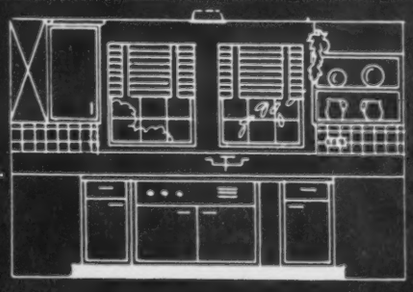

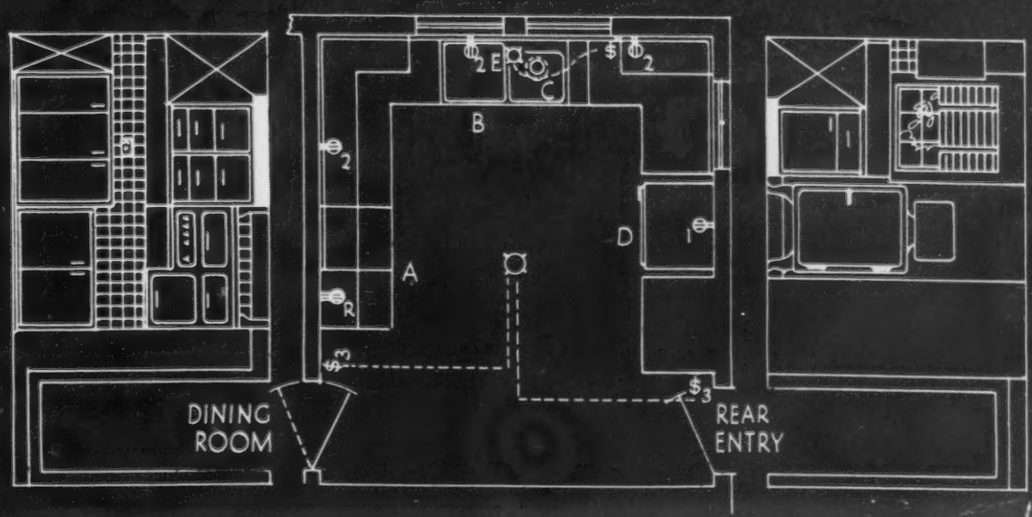

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Coming Features

Bonneville Dam Feature

ELECTRICAL WORLD in a special insert to appear in the September 11 issue presents a comprehensive description of the outstanding technical features of Bonneville Dam. Particular emphasis is to be given the description of features relating to power generation.

Petersen Coil on Colorado Line

The Shoshone transmission line in Colorado crosses the Continental Divide three times in 155 miles. To minimize the effects of bad exposure and improve service continuity, Public Service Company of Colorado is operating one of the few American Petersen coil installations on this line. W. D. Hardaway will discuss the installation in an early issue.

Case History of a Water Heating Group

Indianapolis Power & Light Company has about 1,000 electric water heating customers. Roy Thurman of the Indianapolis company has made a comprehensive analysis of the energy consumption and billing of this group of customers. ELECTRICAL WORLD will pass the analysis along to its readers soon.

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ELECTRICAL WORLD

AUGUST 28, 1937

What Do the Folks Back Home Have to Say?

Congress has gone home. What the members learn from the folks back there will be of major importance to the electrical industry, not only because of its influence upon the direction of future legislation, but also because of its bearing indirectly upon financing for expansion.

Has the tide of public opinion started to swing away from approval of New Deal policies? Are the people beginning to see the flaws in many of the Administration's programs, such as TVA? Do the several states want to give up more of their rights and become mere parts of federal power districts? Are navigation and flood control acceptable pegs upon which to hang the government's water-power and public ownership program? Are the voters willing to continue to pay mounting taxes in times when the budget might be easily balanced and a surplus secured? Does the average man on the street want to have the Supreme Court so organized as to be no longer independent and unbiased in its judgment?

These and dozens of other questions relating to labor legislation, crop control, social security, relief, etc., members of Congress will be asking of their constituents in the next few weeks, and the answers they receive will determine the extent to which senators and representatives will exercise an independence from executive domination.

Without any doubt there has been a revolt against the New Deal, not only in Congress but among the electorate. The question is how great.

TVA, which was to be the great boon to the South through extremely low rates, has had to accept the galling fact that a utility company could produce electricity from steam for less than it could be purchased from TVA. The advisability of hitching power development to flood control and navigation is now being questioned by others than the electrical industry. The great water-power projects of the Northwest are now about ready to produce energy, but with no market. The significance of these things the public is beginning to appreciate.

Newspapers, which are perhaps as good an indication as any of public opinion, show a trend toward fair play for private utilities, which would indicate that any further effort to penalize or restrict the activities of the electric utility industry might not have public approval. Low rates and good service have substantially weakened the opposition of municipal ownership advocates.

While the trend of public thinking is favorable to private utilities, there is still the question, as pointed out before, of the extent of this trend. Nobody probably can determine it more accurately in a short space of time than a trained politician. For that reason the next session of Congress, be it on special call in the fall or later, will be of more than passing interest to the electrical industry.

The industry has gone ahead in a remarkable fashion under the handicaps imposed by government. It has had the courage to extend its investment and broaden its service even in the face of possible public ownership or competition. It has absorbed higher taxes, reduced rates and maintained a good earnings statement. But the industry can do much more if the sword that is constantly hanging over its head is removed. Money would be available in almost unlimited amounts for expansion, which in turn would require a more intensive development of the market, with the inevitable benefits to the consuming public.

Could there be a better time for a local operating company to make sure that the contributions that private initiative has made to the welfare of the community are thoroughly appreciated by the citizens it serves?

START UP NEW BOILER IN ROCHESTER'S STATION 3

Igniting the powdered fuel burners in the number two boiler of Rochester Gas & Electric Corporation's station 3, Vice-President Joseph P. Haftenkamp touches off the gas ignition torch with an electric lighter. This new boiler, the second of four planned for station 3, is capable of burning 12 tons of powdered fuel per hour and will evaporate 120 tons of water an hour. When the four boilers are installed they will develop 1,000,000 lb. of steam and require 400 tons of water each hour

Novel Measures Make City Distribution Trim

Aerial Primary Cable, Underground Transformer Vaults Improve the Appearance and Safety of Commercial Distribution System

By W. I. WHITEFIELD . . . J. L. WHITE
Appalachian Electric Power Company, Roanoke, Va.

IN REBUILDING the distribution system in the downtown area of Roanoke, Va., for additional capacity it was also desired to improve the appearance of the pole leads and equipment as much as possible and to eliminate construction congestion and make it safe and convenient for firemen and others to work on and around the energized circuits, transformers, etc. Plans were prepared and carried out incorporating aerial cable for primary circuits, underground vaults for the larger transformer installations and three-phase, "stacked unit" transformers mounted on steel poles for the smaller installations, special three-phase inclosed oil fuse-cutouts, and other special construction features. The desired results were attained with the increased capacity provided, yet the appearance of the poles and equipment was greatly improved, unsightly congestion of crossarms and open wires eliminated and hazards of working on or around the conductors removed. Comparison of the new system with the old can be made by referring to Figs. 1a and 1b and to Figs. 2a and 2b.

As is usually the case when rebuilding an existing system, certain factors had to be considered which influenced the plans for the new layout. Steel poles of sufficient height and strength for ordinary overhead construction were already installed. These poles also serve as trolley support poles and for mounting the ornamental street lighting brackets and fixtures. There are very few alleys in the downtown district of Roanoke, which entirely eliminated the possibility of alley construction.

The existing secondary system consisted of separate three-wire, 115/230-volt lighting and three-wire, three-phase, 220-volt power circuits with separate transformer banks. Transformer locations were at a premium. Load conditions varied from 50 to 450 kva. per block. These, together with other factors, were considered in preparing the final plans.

One of the features of the Roanoke installation is the use of aerial cable for the 2,400/4,160 Y-volt primary circuits. Three single-conductor, non-metallic sheathed insulated cables (Kerite) were grouped together in a marlin cable hanger and suspended from a "Copperweld" messenger, the messenger also serving as the neutral for the 4-kv. Y primary. This cable is shown in the illustrations, Figs. 1a, 2a and 3a. The primary circuits were routed so as to have, as a rule, only one circuit on a pole with sec-

Fig. 1—Aerial cable and underground vault esthetic improvement

(a) Transformer vault vents visible in the street. Primary run in small conduit down pole. Secondary riser cables inside steel pole. (b) Same pole before rebuilding.

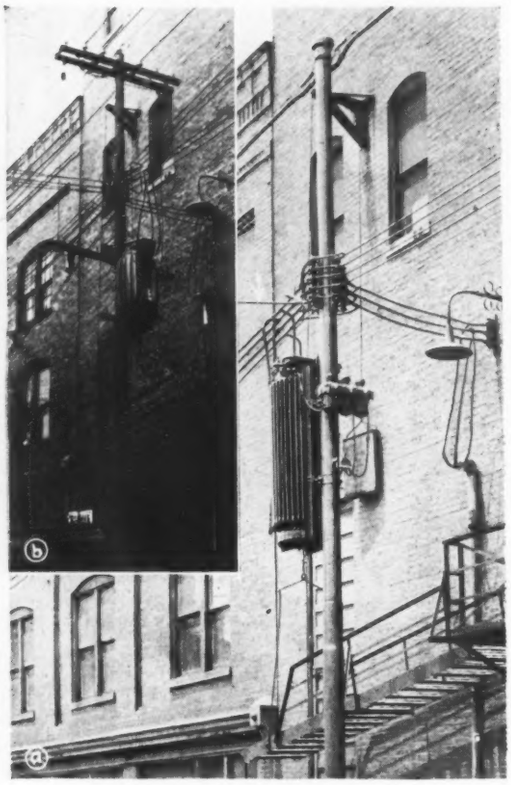


Fig. 2—Three-phase transformer mounted on steel pole

(a) Note service cable crossing street. Cutouts mounted back to back with three-phase, "stacked-unit" transformer, (b) The same pole used to look like this.

tionalizing and tie facilities provided at certain junction corners. Crossarms for primary circuits were done away with, leaving just a neat appearing pole with the snug-fitting primary and secondary conductors rather high on the poles and not of disturbing appearance.

In order to avoid unsightly overhead transformer installations for serving the four-wire, 120/208 Y-volt secondary circuits, the larger transformer banks were installed in underground vaults. These vaults were located adjacent to existing tubular steel poles and the poles used as riser pipes for the secondary riser cables between the transformers and the overhead secondary conductors. Fig. 4 shows the general scheme used for these installations and Fig. 1a is a picture of the same job. The problem of supporting the heavy secondary riser cables was solved by using Kellems woven bronze cable grips, slipping these over the cables at the upper end until they were in a position inside the pole to support the cable and hanging the grips on a bolt through the inside of the pole by means of a bail and hook.

Connections to the aerial primary cable were made by staggered connections in the grouped cable with No. 4 non-metallic Kerite insulated cable, the primary down-leads going through a 2-in. steel conduit clamped close to the steel pole. Special three-phase D & W oil fuse-cutouts with one common operating handle were used, these being mounted on the pole. As a general rule, transformer banks of 150 kva. capacity and larger were placed in underground vaults.

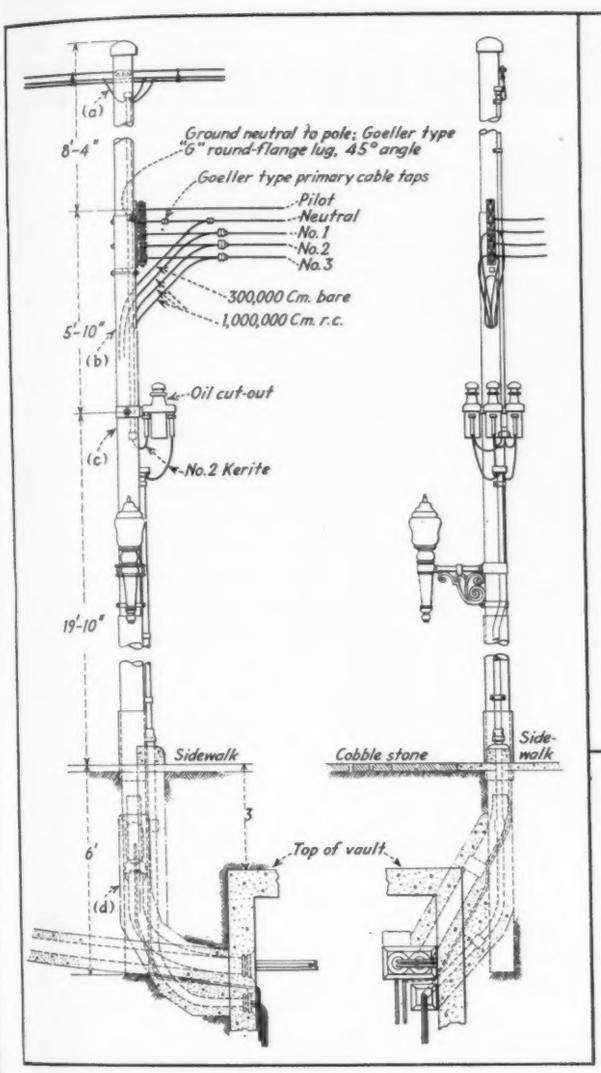
Three transformers in vertical tanks

Transformer vaults are more or less standard underground vaults, designed to accommodate three 150-kva. subway transformers, with provisions made for the installing of secondary network protectors if later required. Vaults are of poured concrete with conventional manhole and cover and two ventilating ducts.

Where a transformer capacity of 112½ kva. or less was considered adequate, three-phase transformers made up of three single-phase core and coils, stacked vertically in one tank (commonly referred to as "stacked unit" transformers), were mounted directly on the steel poles without crossarms on brackets. The same type of fuse was used as for underground vaults, but in this case the pole is not needed for the secondary risers, hence the primary is brought down inside the pole to the

Fig. 3—Unsightly congestion at street intersections eliminated

(a) Street intersection after being rebuilt. (b) Same corner—before.



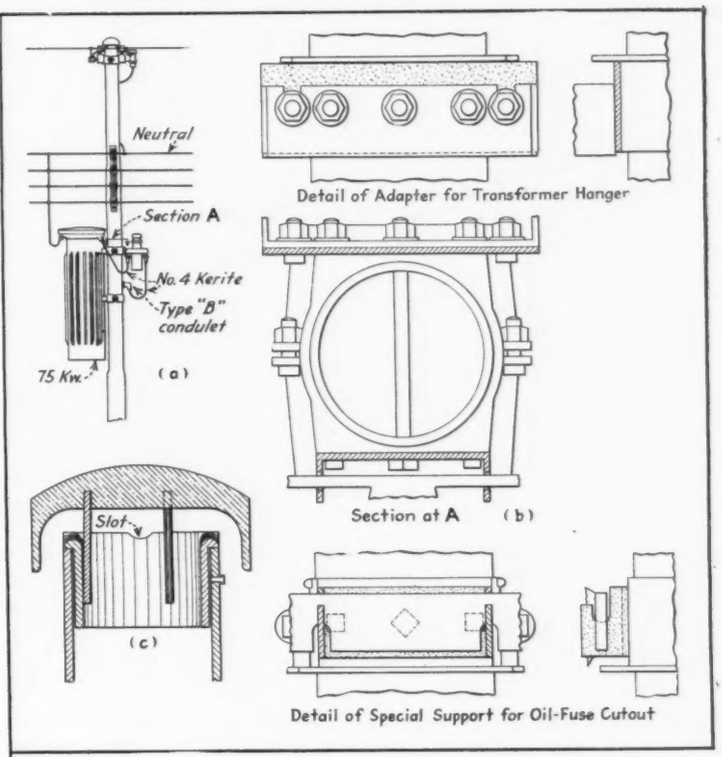


Fig. 5—Special fittings for mounting transformer on pole
(a, b) Common support for oil fuse cutouts and transformer. (c) Pole cap and bushing for primary entrance into pole.

Fig. 4—Typical set-up at underground vault
(a) Aerial cable primary and primary tap to transformers. (b) Secondary cables up inside pole, supported by "Kellems" grips. (c) Three-phase oil fuse cutouts. (d) Underground conduits and vault.

cutout and transformer. Fig. 2a shows such an overhead transformer installation. In Fig. 2a, however, the transformer is a 150-kva. unit, and although larger than now being installed overhead, it is to be noted that even this large unit does not present such an incongruous sight, but that its long, relatively narrow case conforms generally to the desired vertical aspect of the whole installation. The 112½-kva. transformers do give a smaller and neater appearance. Fig. 5 shows design drawings for the special collar bracket made up for mounting the transformers and cutouts and the details for the pole top used for accommodating the primary leads carried inside the pole to the fuses.

Crossings reduced to minimum

Secondary conductors are not carried across main street intersections, extending only between inside corners of one block. This eliminated crossing conflicts and congestion at street corners, where such would be very noticeable. All existing lighting and power services were cut over to the new four-wire, three-phase, 120/208 Y-volt circuits. Secondary conductors were carried vertically on the steel poles on 4-in. rack spacing. Ordinary weatherproof wire was used, varying in size according to load involved. The close spacing not only presents a better appearance, again carrying out the desired "vertical" aspect, but with lower reactance appreciably lowers the circuit voltage losses. Where necessary to extend secondary wires to the opposite side of the street, such crossings were made at right angles to the main line, and inside the block, so as to conform in appearance with the general lines of the trolley span wires, etc. Many open wire services were replaced with service cable.

In order to carry out the plan of eliminating hazards from open wire high-voltage circuits the series street lighting system was removed and the ornamental bracket "Whiteway" system cut over to multiple, fed from adjacent secondary circuits and with both part-night and all-night lights controlled by one low-voltage pilot wire and a system of "Polatrol"* relays. The pilot wire is carried on a spool of the secondary circuit rack.

The new system has in every way come up to expectations and no serious construction difficulties were encountered. It is capable of being expanded to meet increased load conditions and a general layout has been prepared for extending this scheme to adjacent streets as the conditions warrant changes. In preparing the plans for rebuilding this system and in carrying out the work the Roanoke organization received the help and co-operation of engineers of the American Gas & Electric Company.

*A more complete description of the "Polatrol" street lighting control system will appear in a future issue.

Study Motor Requirements

By R. C. ALLEN
Industrial Engineer
Westinghouse Electric & Manufacturing Company, Boston, Mass.

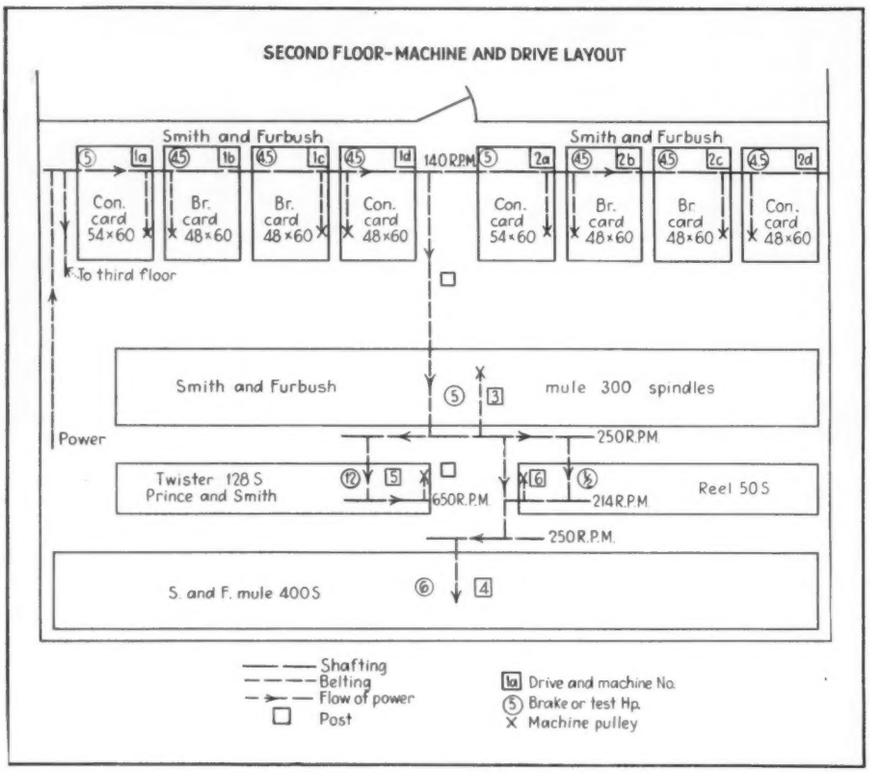


Fig. 1—Essential information on machine and drive layout for each floor provides basis for estimating motor requirements and selecting proper drive locations

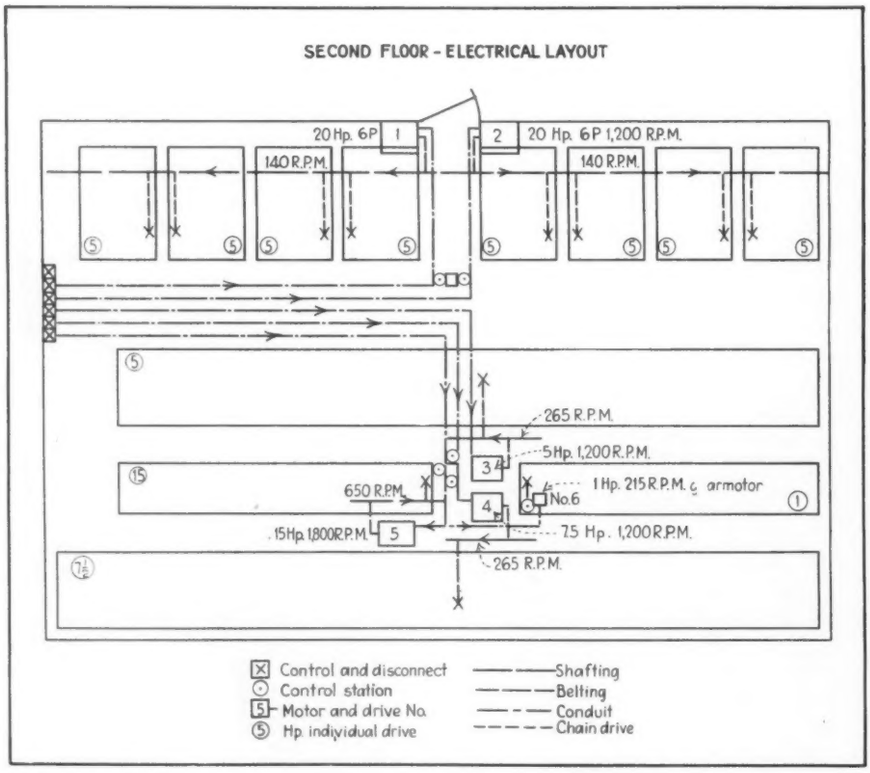


Fig. 2—Final motor and control locations as well as conduit runs and drive arrangements are drawn to approximate scale on an electrical layout

ANY PLAN for increasing industrial plant capacity by changeover either from generated to purchased power, from direct to alternating current or from group to individual drive must give close attention to the driving requirements of machines and to the utilization of motors if the optimum plant efficiency and economy is to be realized.

Proper correlation must be obtained between the production schedule and machine grouping, horsepower and speed requirements of drives, type and characteristics of motors, function and arrangement of control and the location and hook-up of the drive. The schedule for the changeover must also be arranged so that it will not interfere with production. All these factors must be studied in their proper relation one to another before the changeover takes place.

In making a changeover study of any important size a floor plan drawn to approximate dimensions should be prepared on which the machine layout can be indicated and on which information may be recorded. Each machine or group should be given a number, and under this the complete information on the machine recorded. Line, countershaft and belting arrangements previously used should be shown with their important speeds and pulley sizes and marked to show the flow of power. It is also desirable to indicate important building columns on the layout (Fig. 1) to determine the desirable location of motors and their control. Machines should be grouped for motor drive into manufacturing units selected to permit operation of sections for economical production at partial plant capacity. Where more than one machine or group of machines is used for the same work they should preferably be driven from two or more motors and arranged so that each would be part of a complete production unit. This

for Plant Changeover

Analyze Machine Loading and Grouping for Production —Study Selection of Motor and Control—Arrangement of Drive in Planning an Increase in Plant Capacity

also facilitates inspection and repairs on machines or motors. If motors of the same horsepower and speed can be used it will simplify the repair parts stock.

Load test

In determining the correct horsepower and speed requirements for the machines it is the safest practice to make tests, using a test motor of known characteristics, for each drive with the machines loaded under actual operating conditions. These conditions should include not only operation under the normal production schedule, but particularly that for maximum production or any different operation to be met by the new drive.

Care should be taken that the machine operator or person in charge is satisfied that the test is representative of the actual operating conditions encountered and that the type of drive proposed will be satisfactory. This is particularly important when changing individual driven units from direct-current motors to alternating-current motors as the actual speeds, or speed adjustment, obtainable may not be the same, and consequently the machine may not have operating characteristics exactly the same as obtained with the present drive.

If the machines are being driven by a motor, input readings can be taken and the output calculated. The motor efficiency and power factor can be obtained from the manufacturer or estimated.

$$\text{Hp. (Output)} = \frac{\text{Kw. (Input)} \times \text{Efl.}}{0.746}$$

Horsepower can also be estimated closely from the motor full load or rated current and the load current on the basis that the horsepower will vary in direct proportion with the current and kw. input at least for the range of half load to load and a half as shown in Fig. 3.

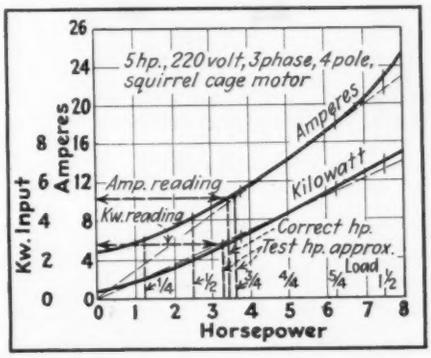


Fig. 3—Estimate motor load from current and kw. input readings

Horsepower of a drive can be determined closely between ½ and 1½ rated load from either kw. input or load current on the basis that horsepower varies in direct proportion to current. This also applies for d.c. machines.

Where separate motor tests are not easily obtainable the machinery manufacturer's recommendation can generally be secured. A request for such information should include any and all identifying numbers or nameplates on the machine, together with the operating speed and production capacity being considered.

Motor rating selected should have ample margin to handle present load as well as any expected increase in the future due to unfavorable operating conditions, such as aging of the machines, etc., or where increased production is anticipated. A motor loaded to between three-quarter and full load is considered desirable, as this allows a factor of safety for operating conditions yet secures high efficiency for the load. If in doubt select the larger motor size as a motor burnout, and loss in production will probably be more costly than the difference in the equipment and the subsequent change after a test has been made.

Fig. 4—Select special motors for special tasks

Fan cooling saves this motor from dust and water that would jeopardize an open motor.

Speed adjustments, where required, must be checked with the load torque at the various speeds. There are variable torque drives such as fans, blowers and centrifugal pumps, constant torque drives like laundry roll ironers, and conveyors and constant horsepower drives as are found in most machine tools. The slip-ring motor is generally satisfactory for speed control where the load does not fluctuate excessively. Standard multi-speed squirrel-cage motors are also available if the actual speed combinations obtainable are satisfactory. Where these are not sufficiently flexible the direct-current, adjustable-speed motor or a mechanical speed changer is required.

For loads having high inertia, as for centrifugals or laundry extractors, larger shears or presses, it is well to check the machinery and motor manufacturer giving complete information on the machines as these drives require special consideration for the motor selection.

It is important, particularly for individual drives, that the motor selected have ample starting and accelerating torque for the drive under actual operating conditions, and for the actual voltage that will be available at the motor. In a properly laid out distribution system rated voltage (at least within 5 per cent) is supplied

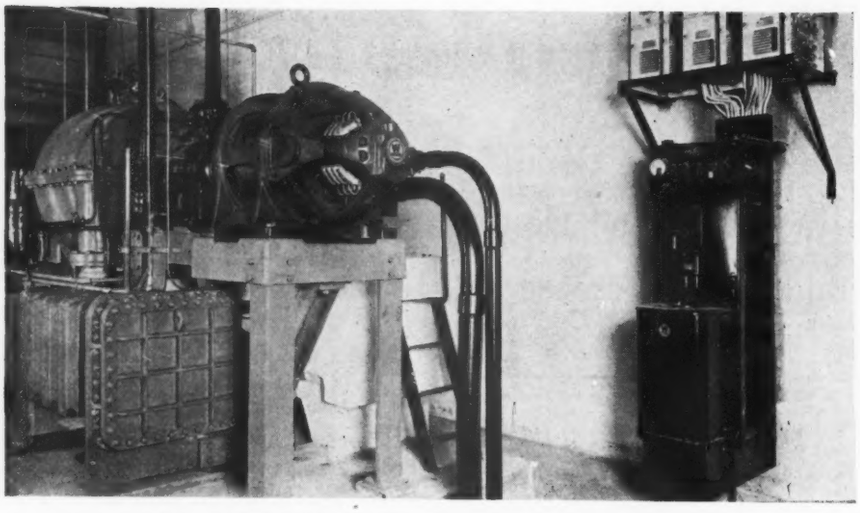


Fig. 5—Provide for speed control where necessary
Open type wound-rotor motor with drum controller, secondary resistance and primary breaker driving centrifugal circulating pump.

Fig. 6—Gearmotors allow direct connections to slow machines
Efficient high-speed motors can be directly coupled with slow-speed machines without going to pulleys or chains. This one is at work in a grain elevator.

at the point of use, but this should not be taken for granted.

Types of motors and drives

Motors are available with the starting and accelerating characteristics necessary to handle practically any drive if properly applied. Standard open type, general purpose motors will be found satisfactory for the majority of constant-speed drives, but motors with special features should be supplied where so required.

Motors should be selected with as high a speed as practical, not only because of their lower first cost but principally because of higher operating efficiency and power factor. Most machines run at relatively slow speed, thus requiring some type of speed reduction between the motor and the load. The most common type is of course the belt drive. In some cases these introduce losses, obstructions and replacement expense, particularly where a countershaft is necessary. Chain drives are more satisfactory. The gearmotor gives a good drive, where applicable, since it frequently permits a direct or coupled drive and yet secures the high-speed motor.

Motors and their drives should be located where they will be accessible, to facilitate inspection, yet not interfere with the normal operation of the machines. In changeover jobs the old belt drives are sometimes used and the motors suspended from the overhead structure or mounted on a platform with a chain or belt drive to the existing countershaft. Permissible pulley reduction or ratio, between the driven shaft and the motor, depends principally upon the center distance, but should not exceed 5 to 1 unless the drive is calculated. Neither should a motor pulley smaller than the recommended standard be used without a careful check.

With individual drives the problem is to make the new motor fit the machine mounting available. Frequently mounting bases or adaptor plates can be secured from the machinery manufacturer for the proposed motor. The present-day motors, having standardized mounting dimensions for corresponding ratings, greatly facilitate these substitutions.

After the methods of drives have been determined the motors should be indicated in their approximate location on the layout sketch and marked with their identifying drive numbers, or preferably a new sketch made up on which the unessential information is omitted (Fig. 2), but which gives a clear picture of the proposed layout. This should also include the control and distribution system with conduit runs in their proposed locations.

Control and wiring

The selection and the type of control are determined by many factors other than the horsepower and type of motor required by the drive.

Controls should be accessible for inspection, adjustment, and repairs. Some disconnecting means should be provided for the motor and control, preferably of the circuit breaker type. The distribution system should be laid out with ample capacity for the present load and, where conditions warrant, provisions made for future additional circuits. Motor feeders should branch out from a centrally located distribution panel or switchboard. These boards should be accessible and incorporate the necessary safety features.

Schedule for changeover

There is seldom a convenient time for the actual changeover. It usually means interference with production schedules or expensive overtime work. If purchased power is to be used the changeover, when once started, should be completed as soon as possible in order to avoid high cost for smaller increments of power used.

The preliminary work of installing the distribution system—conduits, wiring and boards—can generally be done without affecting production, and even the control and motors for group drives can frequently be installed and connected preliminary to the actual changeover.

It is desirable to have a schedule of procedure so arranged that the plant can be changed over in sections. Each section would consist of a room, de-

[*Continued on page 91*]

Why Promote Planned Electrical Kitchens?

Six Months' Work Produces 1,461 Kw. Added Load Connected, Yielding $10,000 Worth of Merchandising Business and $11,562 Yearly Revenue With But Two Men on Full Time

By HENRY B. KANE
Kitchen Modernizing Service, Boston Edison Company

WE HAVE heard a lot about the all-electric kitchen in the last year or so. We have heard it described as a "package kitchen" and "ensemble selling." As central-station men, some of us are merchandising, some of us are not. We have pictured and had pictured for us gleaming white kitchens, full of cabinets, linoleum, planning desks and Venetian blinds, and many of us have wondered why we should get "messed up" with a lot of plumbing and carpenters' supplies. The grief in selling complete installed kitchens seems tremendous. Maybe it is. But that still does not detract from the fact that the all-electric kitchen is the greatest sales aid the industry has ever seen and that it is to the advantage of every one of us to get into it and push it to the limit, whatever limits we may individually have.

Abandon piecemeal approach

There's nothing new or startling about this business. It's so extremely logical that the only wonder is it didn't get under way years ago. Heretofore, we've been selling parts—not spare parts, to be sure, but still parts. You might liken the range to the motor of a car. People are interested in motors not for themselves but only as a part of the whole car. When we sell a range we're actually selling part of a kitchen. All this complete kitchen business amounts to is a change of thought, a broader outlook and a consequent lessening of sales resistance to the details of an individual item.

No more favorable position could be imagined than that in which the central station finds itself today. The groundwork has been laid. For almost two years manufacturers of all types have poured money into the advertising of the complete, planned, all-electric kitchen. Newspapers and magazines have treated the subject at great length editorially. They have run contests, held demonstrations, offered services. The National Kitchen Modernizing Bureau estimates that better than $5,000,000 of space was devoted to this subject last year in the editorial and feature columns. It was there because these publications knew it was what their readers wanted, that it was of real interest to them. They crystallized a half-formed wish into a desire. Now it is up to us to capitalize on that desire. It is up to us to identify ourselves with a movement which is speeding the day when the all-electric home will be commonplace and anything less a makeshift.

Henry B. Kane

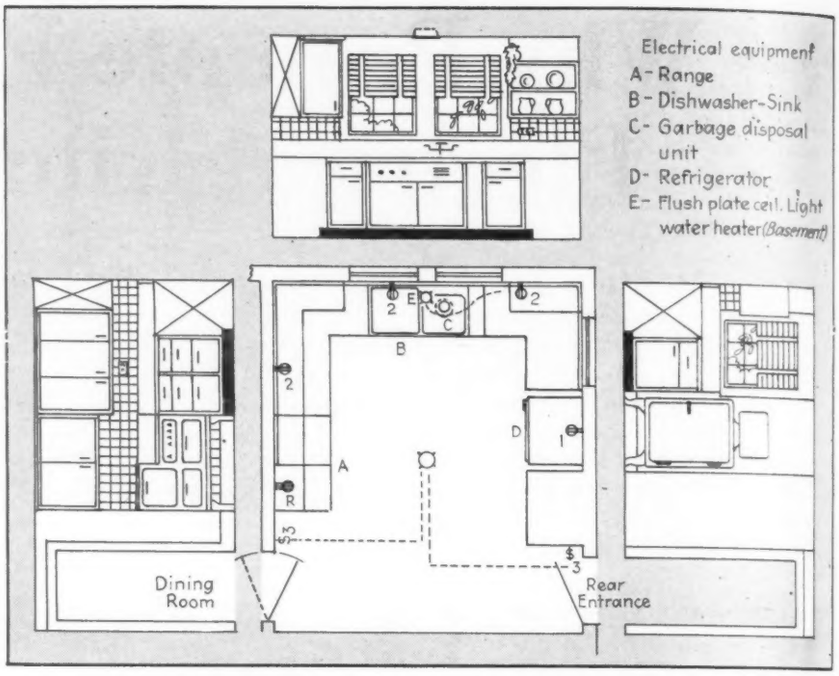
One plan in eight has sold complete electric kitchen

Not so long ago a sales manager had to guess at the potentialities of this business. No one had ever tried it before, no one knew whether it should be treated as a campaign or a permanent activity. Not so today. We have actual case histories to guide us, with the results in many cases of a year's experience or more to back them up. The West Penn Power Company started as far back as 1932, and today it has three draftsmen and some 35 men in the field devoting their time to this work. The Hartford Electric Light Company has been operating a kitchen planning service for more than three years and its force has been increased to nine men at the present time. Results for the country as a whole indicate that one plan in eight results in the installation of a complete all-electric kitchen. Just what percentage is directly responsible for the start of a step-by-step plan by the sale of a major appliance is impossible to determine from the figures available. We do know, however, that it is high. How high it can be is well illustrated by the experience of the Boston Edison Company.

In July, 1936, a Kitchen Moderniz-

ing Service was set up in the promotion department of the Boston Edison Company, a company with some 300,000 domestic meters in an area of 740 square miles comprising 39 towns and cities in addition to Boston proper. Since that time two men have devoted their full time to this work. Their services have been rendered to dealers, real estate operators, speculative builders, apartment house owners and home owners. In the ten months since they began operations they have planned 471 kitchens.

These men work in co-operation with the regular sales force. They make the survey, draw the plan and, in company with the salesman, present it to the customer. Last year in six months operation they were directly responsible for more than $10,000 worth of business—business that would not otherwise have been secured. Of the 182 plans which had been definitely closed at the end of these six months 95 per cent had resulted in the sale of one or more major electrical appliances, only eight having been lost to competitive equipment. Four complete kitchens were installed, including range, refrigerator, water heater, dishwasher-sink and garbage disposal unit. The added load was 1,461 kw., representing a yearly revenue of $11,562.



Sells almost two major appliances

Sample 8¼ x 11¼-in. drawing of kitchen layout which is submitted to prospective customer in colors to scale, protected by cellophane cover and cardboard mount. Edison promotion department supplies copies to architects, dealers, contractors and others interested. Out of 174 plans prepared, 1.75 units of major electrical equipment were sold per plan.

Advisory service on non-electrical matters

Members of the Edison company made a rather complete study of the field before they began operations. They reached the conclusion that the only possible justification for selling complete kitchens with the consequent entry into new and non-electrical fields would be as a necessary adjunct to the sale of electrical merchandise. If it should turn out to be essential to sell cabinets and linoleum in order to sell complete electrical equipment, then they would have to do it. They did not, however, consider this to be the case. Experience during the last ten months has justified their decision. The submission of plans supplemented by an advisory service on non-electrical equipment and the sale of electrical merchandise has proved to be sufficient. Where a complete remodeling job was to be done no difficulty was experienced from the fact that it was not handled by one agency—one of the main arguments advanced for our going into the complete installation business.

The value of a planning service as a sales aid is incalculable. To the home owner the plan is a personalization of all the magazine articles he has been reading. It makes him realize that his own kitchen can look like those pictures that he has been admiring in an abstract way. If it doesn't sell all the equipment at once, it may sell more than would otherwise have been the case. It may be the start of a step-by-step plan because it has created a dissatisfaction with his present kitchen that can only be overcome by its complete eventual modernization. This is not theory, it's fact. One hundred and seventy-four Boston Edison plans averaged sales of 1.75 units of major electrical equipment. That's almost two for each plan—not just a refrigerator, but a refrigerator plus a range, or a range plus a water heater.

Speculative builders welcome such a service. It was a major item in the sale of electric ranges and refrigerators in 63 per cent of the more than 1,400 new speculative homes erected in their territory last year. It has been most effective in apartment house work, both new and remodeling. These two fields, highly competitive, have usually been considered the sole prerogative of competing interests. Architects have shown themselves ready and willing to accept the help of a trained kitchen planner. Salesmen had previously found them unapproachable.

From the sales angle, it's almost perfect. From the load-building standpoint, it's even more so.

"The easier it is to use an appliance the more use it will get. A food mixer in the attic wouldn't show much on the meter. Easily accessible in a planned kitchen, it will be in constant operation. Elimination of pantries releases areas which may be readily converted into laundries in many cases. First-floor laundries make it easy and convenient to use washers and ironers. These, of course, are just incidental to the sale of new heavy-duty appliances in the kitchen. So, even if sales as such don't mean a thing to you, residential load building certainly does, and there's never been a better, more logical, more easily acceptable or operated method of accomplishing that end than through the planned electric kitchen."

Flue Gases "Scrubbed Out" in Boston Edison Plant

Model Tests Demonstrate Feasibility of Spray Form of Scrubber for Stack

EXTENDED experiments by the Boston Edison Company toward the elimination of discharges of solid matter from the chimneys of its L Street generating station in South Boston have brought about an interesting design of scrubber under the direction of the engineers of this large utility. At L Street eight 1,232-hp. boilers discharge their flue gases into a single chimney. These boilers are fired by underfeed stokers, which, with forced and induced draft, develop about 250 per cent of boiler rating.

Of five different commercial types of flue dust catchers on thirteen different boilers, the best tested in service was the Pease-Anthony gas scrubber equipment installed six years ago at the Kneeland Street district heating plant in downtown Boston, with three boilers fired with pulverized coal.

It was desired to obtain equally good removal from the flue gases at L Street, but it was not practicable to install the Pease-Anthony scrubbers. The possibility of scrubbing the flue gases in the boiler plant chimney was considered and the necessary research program undertaken.

Visibility provided for

A model of the proposed chimney scrubber was constructed on a 1-to-18 scale. The lower section was made of copper, so as to be easily modified for various inlet shapes, and the top was built of a transparent material which permitted observation of the flow pattern by means of smoke and colored yarn.

A series of tests was conducted with various inlet shapes and the data plotted and rechecked. The model test results were then stepped up to full-size conditions by the laws of hydrodynamic similitude. The design finally adopted as a result is shown.

Essential features are a chimney lining and floor of acid-proof brick set in acid-proof mortar. The lining has a top diameter of 17 ft. and extends 156 ft. 6 in. above the floor, which is at the station roof level. In the inlets baffles were constructed to develop the necessary gas spin and water sprays were installed as shown.

In the center of the scrubber an access and inspection tower was built, 5 ft. in diameter and 45 ft. high. This tower permits observation of the scrubber while in operation. There are four spray manifolds in each of the scrubber inlets. Nozzles deliver a finely atomized, cone-shaped spray of water, which is directed parallel to and in the same direction as the gas flow. The water used amounts to approximately one gallon per thousand cubic feet of gas scrubbed.

The water drenches the particles of solid matter in the gases and also wets the interior walls of the scrubber. Inlet baffle walls impart a violent spin to the gas and water mixture which continues to the top of the chimney. The solid matter and excess water are thrown out by the spin of the gas and are carried down the walls of the scrubber to the two drains provided in the bottom. Scrubbing of the gas against the wet walls of the scrubber also aids materially in the elimination of the solid matter.

The excess water and solid matter are drained from the scrubber through a chemical stoneware drain line to

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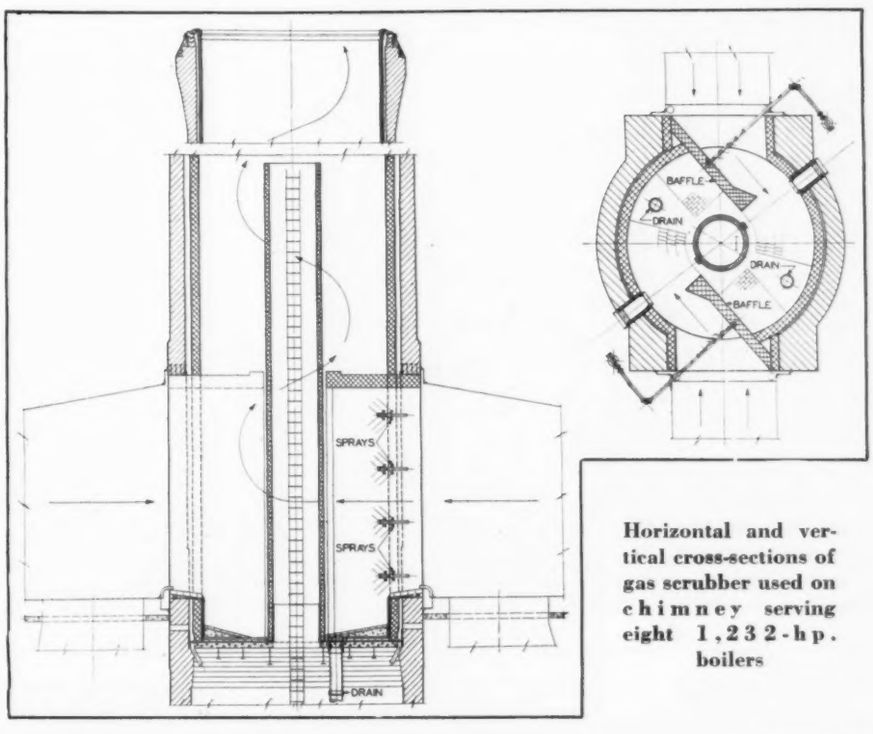

Horizontal and vertical cross-sections of gas scrubber used on chimney serving eight 1,232-hp. boilers

Application of Automatic Shunt Capacitors

Outages Averted and Maintenance Facilitated by Automatic Capacitors on Mesh of Feeders to Farming Area

By EDUARD H. HOEHN
Pennsylvania Power & Light Company, Allentown, Pa.

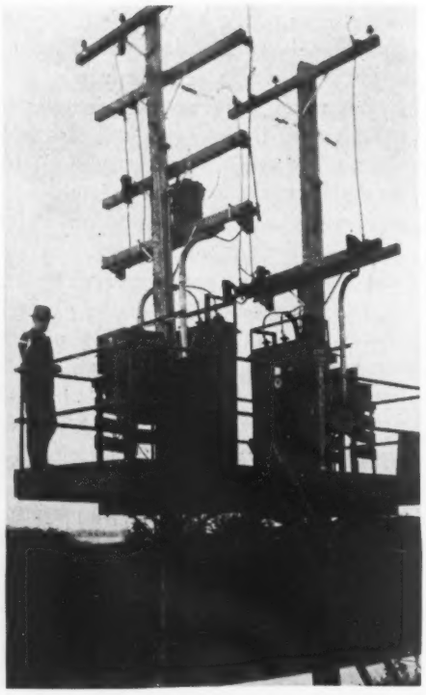

Fig. 2—Two capacitors on pole mounting

At location "H" of Fig. 1. Each 120 kva. with automatic control units 5,000 volts, 75 amp.

SHUNT capacitors have come into general use as a flexible and economical means of improving the power factor of the load and maintaining proper voltage on distribution circuits. While numerous non-automatic capacitors have been installed on distribution feeders to obtain a permanent, invariable voltage increase —sometimes controlled by regulators at the substation—it is only recently that entirely satisfactory and low-priced automatic control equipment has been developed, which is expected to broaden the field of capacitor applications.

In a recent installation of automatic capacitors in the Pensylvania Power & Light Company's system the primary object was to obtain a higher degree of continuity of service and facilitate maintenance work on semi-transmission feeders, rather than to regulate distribution voltage or improve the power factor of the load. Fig. 1 shows the essential parts of the circuits involved. The 11-kv. radial feeders I, II and III carry about 3,000 kw., from substation "E" to a farming district, where a good part of the load consists of dairy refrigerators and incubators, for which continuity of service is of particular importance.

Due to the radial nature of the supply lines, this requirement could not always be met during emergencies and periods of necessary maintenance work. Also, as the load increased, it became difficult to maintain proper voltage on distant 11-kv. rural extensions. Since important stepdown substations in this district are equipped with induction voltage regulators of sufficient range to control satisfactorily the 4,000- and 4,600-volt distribution systems under normal operating conditions, the problem to consider was mainly to provide facilities for maintaining 11-kv. service and voltage under all practical conditions.

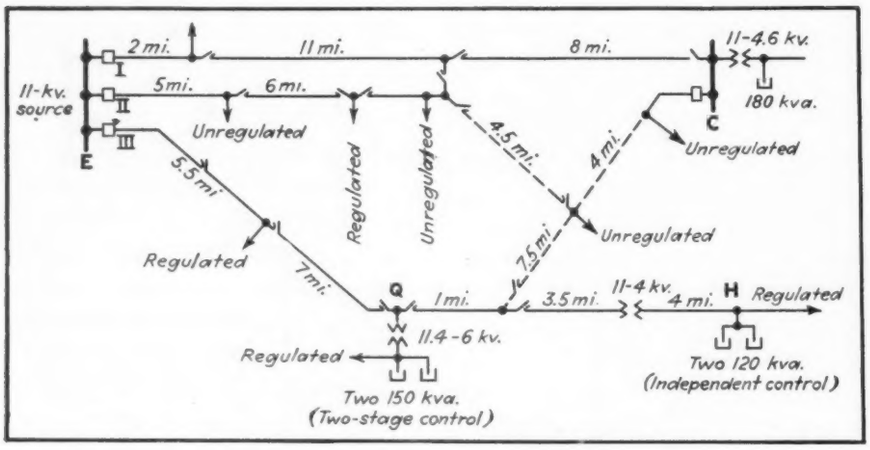

Fig. 1—Automatic shunt capacitors at strategic tie-points of rural feeders afford enhanced service continuity

Capacitors on looped circuits

First, to insure continuity of service, 11-kv. tie lines (shown as broken lines in Fig. 1) were built and sectionalizing switches installed, with the result that practically all loads may be reached over a continuous loop, whose one end would be open at "E," or the loads may be supplied over the three radial feeders shortened or lengthened at will to suit conditions. Second, to maintain 11-kv. voltage regardless of feeder set-up, automatic capacitors totaling 720 kva. were installed at "C," "H" and "Q."

The great advantage of capacitors over other kinds of voltage-regulating equipment, in this case, lies to a great

deal in that their regulation effect increases in proportion to the increase in line distance from the source. Thus, proper subdivision and location of the capacitors has made it possible to switch onto a 17-mile loaded feeder additional 10 miles with 600 kva. load and yet maintain satisfactory voltage at all points. Selective control allows a variety of different operating set-ups and distribution of loads to suit both local and distant 11-kv. conditions for normal and emergency operation.

For greatest combined gain under varying conditions a single-stage, 180-kva. floor-type unit was selected for location "C," two single-stage, 120-kva. pole-type units for "H" and a two-stage installation of two 150-kva. floor-type units for "Q." The none too good power factor of the load made it possible to connect the capacitors to the low side of the step-down transformers without adding to their kva. loading. Thereby, advantage could be taken of the lower cost of 4,000- and 4,600-volt capacitors and switching equipment. The automatic on-off control is set for a certain desired voltage on the unregulated station bus, both on and off switching being delayed 30 to 60 seconds to prevent unnecessary operations on voltage fluctuations of short duration.

The single-stage units at "H" are independent of each other and operate on different voltage settings and time delays, so that after throwing one capacitor on the line the other unit will follow only if the desired voltage level has not yet been restored. The two-stage installation at "Q" includes but one voltage relay to control both units, which are interlocked electrically in such a way that the control devices of the second unit will begin their cycle of operation only if the voltage relay contacts remain closed after the first unit has been switched on. The "C" installation and one each of the "H" and "Q" capacitors may be in service during normal heavy-load periods, but only during emergency operation will all units be switched on.

Switching and control equipment, illustrated in Figs. 2 to 4 inclusive, is of the contactor type and rated 7,500 volts, 300 amp. for 4,600-volt service and 5,000 volts, 75 amp. for 4,000-volt service. The entire equipment of a control unit is inclosed in an outdoor weatherproof housing, with the

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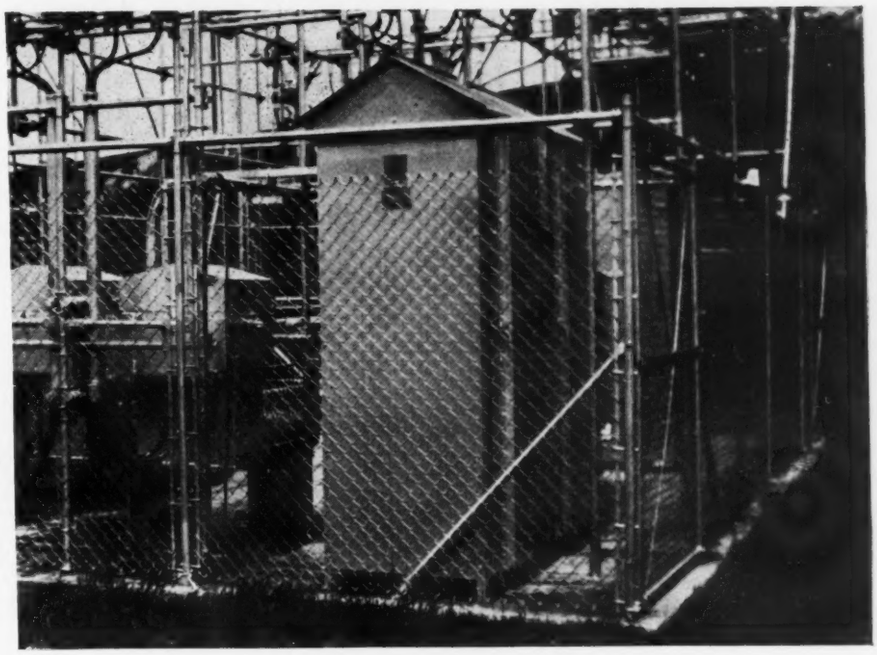


Fig. 3—Two outdoor floor type capacitors in substation

4,600 volts, 150 kva. with two automatic 7,500-volt, 300-amp. control units. At location "Q" in Fig. 1.

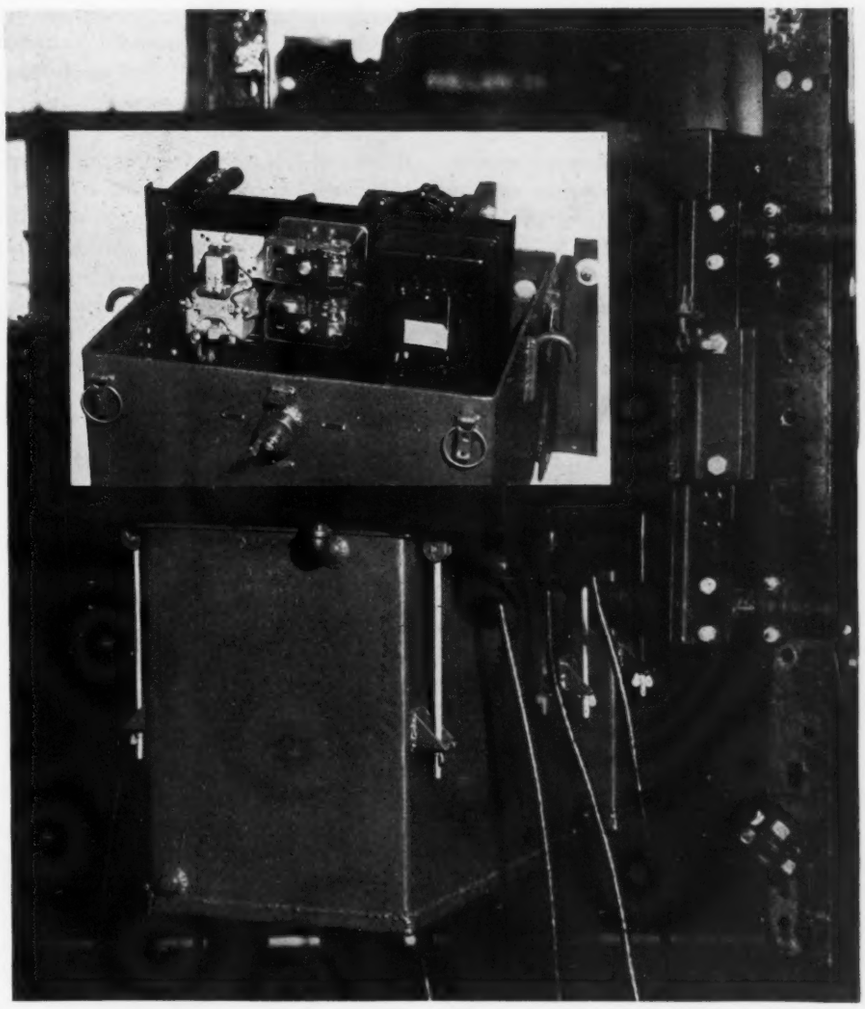


Fig. 4—Westinghouse capacitors with automatic voltage control

75-amp. capacitor switching unit with cover and oil tank in place. The insert shows a 300-amp. capacitor switch unit (with cover removed) and relay panel. Test terminals visible at upper left of panel.

Tube Licensing Situation Hampers Relaying Advance

Suggestions to Cross-Licensing Manufacturers and Users Engaged in Experimental Development of Relay Protection of Power Systems by Means of Electronic Devices

By E. E. GEORGE
Superintendent of System Operation,
Tennessee Electric Power Company, Chattanooga

FOR SEVERAL years a few relay engineers of power companies have been trying out the possibilities of electronic devices for fault protection of power lines or equipment. It seemed reasonable to expect that grid-controlled thermionic conduction would prove more reliable, more sensitive and faster than conduction through metal contacts subject to oxidation, chatter and misalignment, and requiring appreciable time and power to overcome inertia and to provide space separation. It seemed even possible that the mathematical operations necessary to convert current and voltage values into reactance or impedance need not be obtained necessarily by the magnetic reactions of various windings, but might be obtained by the electrostatic reactions in a thermionic tube—with no more complication than the process of modulation.

Power manufacturers' representatives have reported from time to time that they had carried out elaborate and expensive development work along the above lines for several years, but had been unable to produce electronic devices for power system protection. Several relay engineers were sufficiently enthusiastic about the possibilities of using electronic tubes to suggest that while the manufacturers' comments might be true beyond question, there could still be a field for electronic devices in relay protection and system operation.

This latter statement was apparently based on the assumption that certain applications of tubes would be sufficiently special or local to prevent the widespread use that would be needed to justify development and production of complete assemblies on the part of the larger power manufacturers, although there might be plenty of applications where individual relay engineers could select standard tubes and standard circuit parts available on the market for other purposes, and thereby obtain the benefit of low cost due to quantity production and still retain complete flexibility in design and application.

Patents and licenses enter

Relay engineers interested in tubes soon discovered that there was considerable uncertainty or secrecy as to the extent to which tubes (and a few other units) produced in quantity for other purposes could be legitimately secured and utilized in the power field.

In view of the almost complete absence of authentic information available to prospective users, the writer has attempted to canvass every available source of information and to arrive at some authentic conclusions as to the present situation.

It is impossible to get a reasonably accurate picture of the present situation in the electronic field or to realize its significance without the historical background of the last 25 years. The World War convinced the United States government of the desirability of industrial progress as a means of national defense. The government was very anxious that scientific developments useful in national defense remain in the hands of corporations with sufficient financial resources and technical staffs to acquire an outstanding lead and hold it against world-wide competition. Following the end of the World War and the consequent end of the patent moratorium, the United States government therefore suggested to the major companies holding fundamental radio patents that arrangements be devised to continue co-operation instead of litigation.

The principal patent-holding companies in the fields of power equipment manufacturing, telephone communication and radio communication therefore made cross-licensing agreements. Apparently these cross-licensing agreements in themselves did not necessarily encourage or discourage new development or new applications by users in the electronic field, *such effects depending upon how these agreements were interpreted into commercial policies.*

The agreements covered not only all patents then existing but all others to be made by any of the parties in the electronic field until 1954, or during the life of each patent, which ever was later. Many of the original patents were so fundamental that it was economically impracticable to make vacuum tubes of any type without using one or more of the patents of every contributing company. Other fundamental patents have since been

issued, so that even while many of the original wartime patents have expired, the best-posted radio manufacturing engineers in the country state that *even today it is still economically impracticable to make a general line of vacuum tubes without using at least one of the patents in each of the power, telephone and radio fields belonging to parties involved in the licensing agreements.*

Power system use limited

The policies of the power, telephone and radio groups as to sub-licensing have differed wisely. The radio group has been particularly active in sub-licensing, so that there are a large number of manufacturers making sub-licensed tubes and many radio manufacturers using sub-licensed circuits. The telephone industry has sub-licensees in the field of sound picture and research laboratory equipment. There are many sub-licensed manufacturers in the industrial field, but none are known in the power field. Apparently the leading power equipment manufacturers regard themselves the only source of completely assembled electronic devices for commercial use by public utilities in the power field. As shown later, there is considerable difference of opinion among power equipment manufacturers and users as to what is meant by the "power field" and as to the resulting limitations on power company use of electronic devices, particularly for uses not *directly involved* in serving customers.

A clear picture of the electronic tube license situation is given in a chart published in *Electronics* in May, 1935, and reproduced herewith by consent of the publishers. This chart represents conditions as of May 21, 1935, when an important consent decree in federal court became effective. Since this date supplementary agreements have been reached between certain of the parties shown and additional fields are therefore available to these parties. As a result of such supplementary agreements, the radio group has recently revised the license notice on receiving tube containers so as to permit the use of radio receiving tubes in all fields other than communication for hire or toll, power, medical, therapeutic, railway signaling or commercial sound recording, provided the circuits and other devices used therewith are not infringing.

The following paragraphs are quoted from the article in *Electronics* of May, 1935, to which reference should be made for more complete information on the licensing situation, bearing in mind that certain minor modifications have been made since the date of the article:

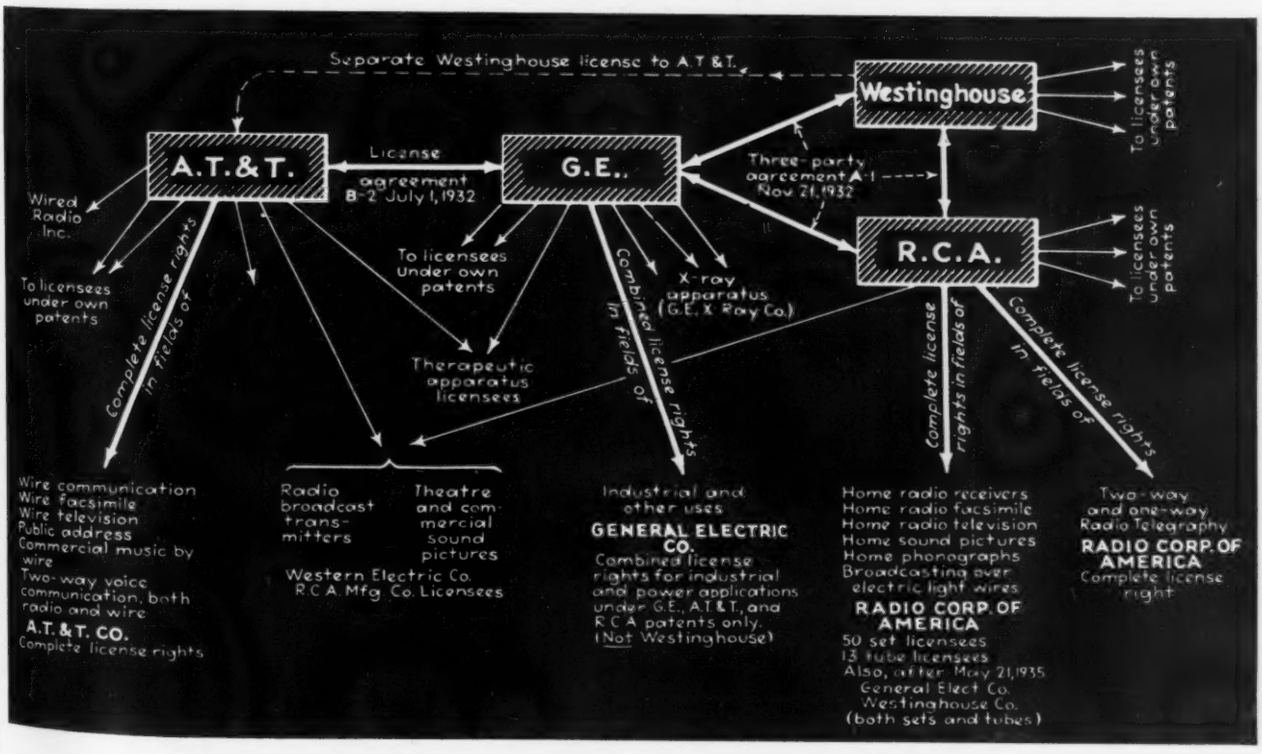
> As shown by the accompanying diagram, each of the principal companies is free to grant non-exclusive licenses under its own patents, in any field.
>
> In certain specified fields, however, particular companies are authorized to grant to sub-licensees "complete rights" to pertinent patents of all four companies, through authority obtained from licensing interchanges, as indicated, between the four large principals.

It should be noted that only the power equipment manufacturing group have complete patent rights in the "power field." The definition of "power purposes" in one of the license agreements is as follows:

> Power purposes means the field of all prime movers and their accessories and all use, control and application of electricity for light, heat, power and traction, including all generating, measuring, switching and other means of methods incidental thereto or involved therein. It involves apparatus for distant actuation and control of apparatus not used for radio purposes and also apparatus for indicating at remote points the condition or position of such apparatus. It does not include any communication purpose.

Radio group has finger in power field

However, the radio group has patent rights in electronic applications of relay devices for power purposes "if



Licensing arrangements under patents applicable to electronic tubes and circuits

As of May 21, 1935, and as presented in *Electronics*, May, 1935

DIFFICULTIES FACING RELAY ENGINEERS

In many cases the relay engineer is faced with one or more of the difficulties outlined below

1. Most power company engineers are not familiar with electronic devices.

2. Some power company executives regard radio equipment as too fragile, complicated, variable or otherwise unreliable for public service purposes.

3. There is considerable reluctance among engineers to use any electronic device requiring a large number of tubes.

4. Engineers have expressed a lack of confidence in tubes because of the inability to determine their condition by a visual inspection.

5. There is a general impression that mechanical relays are fast enough for all present-day purposes, since operating speeds have been reduced to one-sixtieth of a second or less.

6. It is the general impression that tubes are unsuitable for measurement or control because of their slightly variable characteristics with age, and between units (due to manufacturing tolerances).

7. An impression that tube life is necessarily short has resulted from experience with broadcast receiver and power rectifier tubes, which are rated on about the same basis as incandescent lamps.

8. The highly competitive market in parts for broadcast receiving equipment has resulted in the market being flooded with parts of inferior quality, which have a very short life at nameplate rating. Broadcast receiving equipment in general is built with a low factor of safety (1¼ approximately), whereas most other utility equipment is designed with a factor of safety of 4 to 8.

9. Until recently, at least, the stockrooms of users, dealers and manufacturers have held a supply of most repair and replacement parts used by relay engineers. Naturally, the first question raised about new and unusual equipment is the ready availability of spare parts.

10. Most electronic devices have been designed for high plate voltage, requiring motor-generators or transformer and rectifier power supplies. These relics of early radio transmitter and broadcast receiver design are particularly disquieting to the relay engineer, who has spent most of his life trying to improve the reliability of "125 volts d.c." and trying to have all protective devices operated thereby.

such relay devices are not directly or indirectly responsive to the electric condition, speed, motion or position or apparatus or devices." This last definition apparently gives the radio group certain rights in the power field.

Originally the telephone, power and radio groups each attempted to develop the tubes, circuits and accessories required for their own purposes. In some cases this practice was criticised by the users, who insisted that many of the tubes in any field would be adequate in the other fields if there could be a standardization of filament voltage.

Partly as a result of this criticism by the users, there has been an increasing tendency to use receiving type tubes in all fields wherever possible, since this class of tube has the benefit of the largest quantity production and is available in the largest number of types.

WAYS OUT OF THE DIFFICULTIES

The suggested answers to the above difficulties are given below

1. Some members of the sub-committee suggest that every power company should assign at least one engineer to electronic applications and that it try out at least one important device using vacuum tubes.

2. Whenever power company executives see an electronic device put into *reliable and economical every-day operation* they will be willing to give the electronic engineer and his equipment a chance whenever new problems come up for solution.

3. With special tubes selling below $10 and standard tubes at $0.75 or under, there should be no reason to avoid equipment involving several tubes. Certain power uses could be met with only one tube, but there should be no hesitancy to use twelve tubes if it is necessary and economical. Two to four tubes will handle the majority of power applications.

4. The inability to detect tube faults by normal inspection is not especially serious in its consequences—especially in non-attended stations where there is no one to see trouble until long after its occurrence. Whatever of this handicap is mental can be overcome by the use of metal tubes.

5. Vacuum tubes can be used as relays without any commercial speed limitation whatever. For voltage control, frequency regulation and certain other power purposes mechanical relays are too slow.

6. For some applications the performance of tubes is substantially independent of minor variations in filament and plate current. Recently developed potentiometric balance equipment maintains constant amplification ratios under all service conditions. Where intermediate or commercial accuracy is required special circuits for standard tubes are now available.

7. The experience of the telephone industry and others who rate tubes on a conservative basis is that *tube life for continuous duty can be measured in years rather than months, by proper circuit design.* Small reductions in heater voltage and somewhat larger reductions in plate voltage and current will increase the life of receiving type tubes several hundred per cent. The necessary changes in circuit design are simple. Another stage of amplification is frequently necessary. Conservative design increases the factor of safety as well as the life. The average life of receiving tubes in standard receiver circuits is probably 2,000 hours. Circuits designed for lower output will give an average life of more than 10,000 hours. Relay engineers have indicated that annual or semi-annual replacement of tubes might not be objectionable, particularly in case of receiving type.

8. High-grade paper condensers (telephone type) or mica condensers are the basis of good circuit design. The electrolytic condenser seems to have a limited field of application where long life, constant capacity or high reliability are necessary. High-grade resistors are another vital item in high-grade equipment. Copper oxide rectifiers change their characteristics with age, temperature and humidity. The electronic engineer in the power field will do well to get his parts from manufacturers supplying equipment for power, telephone, aviation, research laboratory, police, ship or amateur transmitting services.

9. There is some advantage (partly psychological) in using entirely tubes of the type used in high grade broadcast receivers, as these are available for replacement in almost every city and town which the power company serves. There is no reason why power company stockrooms should not carry such tubes, as well as other frequently used electronic accessories. The large number of manufacturers of high-grade condensers, transformers, sockets, resistors, etc., has made it possible to get good delivery on practically everything required in making and installing electronic equipment on a rush basis.

10. From the standpoint of protective relay application, the most important development in years has been the production of beam power heater type tubes, suitable for 125-volt d.c. plate supply and for connection of several heaters in series. One of these new tubes, the 25L6 pentode, has very desirable characteristics for primary substation application. Heater type rectifiers, such as the 25Z6, also have wide application in circuits where substation storage battery is desirable for heating rectifier cathodes.

SUGGESTIONS TO MANUFACTURERS ON COMMERCIAL POLICY

Many suggestions to improve existing conditions have been offered by relay engineers of power companies. Without passing on their desirability or practicability, these suggestions are presented as submitted

1. Tubes of all makes with a reasonable royalty added to the "radio purpose" price should be made available by the power equipment manufacturers and/or other manufacturers.
2. Manufacturers should encourage the use of electronic devices by co-operating among themselves to remove restrictions on the use of thermionic devices after sale.
3. The right to purchase patented tubes for power uses should include the right to use the tubes in all patented circuits (owned or controlled by the major electronic manufacturers) for experimental power system purposes only and where only one or two installations of *new* applications are involved. This right as applied to any particular development should terminate at the end of one year's use of that development unless the user releases all discovery rights and design and performance data to the co-operating manufacturers, so as to facilitate making the device commercially available.
4. Licensing arrangements should be made available to small manufacturers and to individuals for small-scale production of new electronic devices not justifying activity by the power equipment manufacturers.
5. The sale of parts for other than replacement purposes should be encouraged.
6. Power equipment manufacturers, radio manufacturers and telephone manufacturers should investigate the possibility of further technical co-ordination in tubes, circuits and parts.
7. Electronic tubes and other parts rated for a long life and a *high and known average factor of safety when used at nameplate rating* should be made available to the power utilities.
8. A liberal definition of "experimental purposes" should be established and published, by co-operative action between users and manufacturers.
9. Manufacturers should establish and publish policies of co-operation with customers interested in electronic development work.

Availability of radio receiving tubes to power systems

Many relay engineers believe that practically all uses of tubes for relay purposes on power systems could be met by the standard line of radio receiving tubes. It is therefore pertinent to investigate the conditions under which radio receiving tubes may be obtained for use by power companies. The possibility of getting tubes for experimental purposes has frequently been suggested. Patent law defines "experimental" as referring to invention or fundamental research; that is, the search for and test of a new idea, but not including its further refinement or reduction to practice. The legal definition is naturally the controlling one in any formal situation. Licensing agreements define "experimental" as referring only to research work by educational institutions, scientific societies and other eleemosynary institutions, with no direct or indirect business purpose.

Manufacturers' views

Some tube manufacturers are inclined to regard any new use of electronic tubes as experimental, including not only the first test of the basic idea, but also its reduction to commercially practicable form. Other manufacturers stand by the strictest possible interpretation of the definition in the licensing agreements. Many engineers believe that any work involving new ideas is experimental as long as special performance records are kept and the device is not in general use or in a reasonably final form. Some engineers believe that laboratory equipment and other devices for measurement are scientific rather than commercial in their purpose even when used by power companies, and therefore come under the field of experimental use rather than of power purposes. Another view of power purposes would include only facilities used in quantity for directly serving the public, and would not include experimental or small-scale facilities for the improvement of service.

Judged by the test of present commercial policies of the various groups having licensing agreements, it would appear reasonably certain that these groups acquiesce in power companies purchasing any electronic tubes and parts available in the open market (or sold specifically for research or experimental purposes) and using these tubes and parts in new applications (regardless of tube and circuit patents), if most or all of the following conditions are met:

(a) The application involves new ideas or makes old ideas economically practicable for the first time.
(b) Only one or two devices are involved.
(c) Resale is not intended.
(d) The application tends to increase the market for tubes, parts or completed devices.
(e) The transaction does not prejudice the rights of any patent owner or license owner. (The easiest means of avoiding this is to make a special agreement for each situation.)
(f) The power manufacturers are offered a reasonable opportunity to pursue commercial production of the device after it is put into satisfactory operation.

Although power equipment manufacturers have heretofore professed to see little future for electronic devices for relay protection, they have co-operated in every known instance with relay engineers desiring to use electronic tubes and parts, provided new uses or methods were being developed. The power equipment manufacturers are free to purchase tubes and parts from the telephone and radio groups and resell them for "power purposes" if they are assured they will not be used for other purposes by the customer.

Statement of policy needed

Most criticism by users is directed not so much against existing policies of manufacturers as against the difficulty of learning enough about these policies to proceed safely in advancing the theory and art of electronics as applied to relay protection. The average relay engineer wants to utilize the latest scientific and technical progress to improve electric service and to reduce its cost. If nobody will promptly make and sell him what he wants, he may try to make it, but he doesn't want to fool with electronic devices if his company has to hire a patent lawyer to keep him out of trouble. The only answer seems to be definite, co-ordinated, liberal and public commercial policies on the part of the manufacturers and a co-operative, ethical and liberal attitude on the part of the users. *An open discussion would certainly lead to a better allocation of design and application engineering as between manufacturer and user.*

Schools Become Field Laboratories for Lighting

School Superintendent's Experiments in "Seeing" Lead to a Fourfold Increase in Connected Load and to New Color Schemes for Interiors of Rooms

EVERY so often some scientific mind outside the electrical industry propounds a question or questions that jar the industry from the even tenor of its ways and initiates a new line of research. And such was the case when A. W. Ray, Superintendent of Schools, Sausalito, Calif., asked the industry the simple question, "What constitutes proper school seeing?" Almost any cub lighting salesman would immediately raise his hand and glibly reply that "30 to 50 ft.-candles on the surface of the desk are the current recommendations for lighting and four 300-watt fixtures would do the trick nicely."

Mr. Ray could not believe it was as simple as that. Had any one ever made any recommendations on the best color of light for schoolroom illumination? Did certain color combinations in the room improve vision or enable better concentration on a task? Wasn't there an experiment some place indicating that blackboards were out of date and the "writing boards" of cool blues, grays or greens used with orange or yellow chalk were much easier on the eyes? What kind of control would maintain even levels of illumination throughout a room? And there were many more similar questions that the practical educator considered essential to improving "seeing" in his schools and in eliminating strain from young eyes.

Even the lighting experts hadn't thought of some of them, and those answers that were obtained often were contradictory. In short, Mr. Ray discovered that the standards for adequate vision in the school classroom had yet to be written, so he not only volunteered the facilities of Sausalito schools as a laboratory for an all-industry co-operative study but also devoted all of his available spare time to the investigation to the end that Sausalito's school children might not be handicapped by poor vision in their efforts to study and educate themselves. Although by no means completed, a number of interesting facts have been determined and test installations have been made.

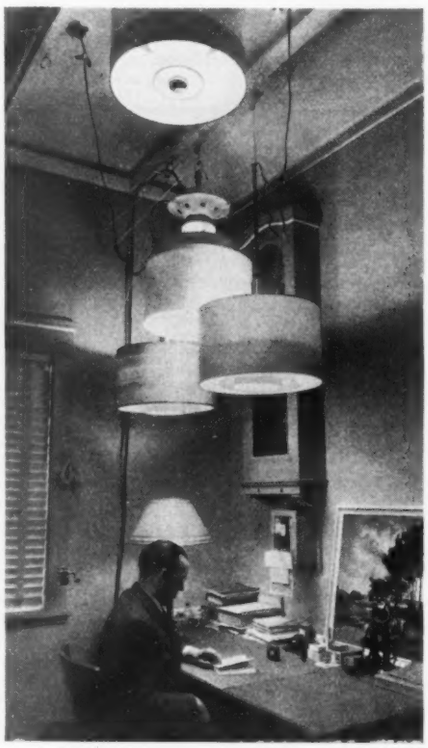


Fig. 1—Three hundred and fifty foot-candles

A. W. Ray in his office-laboratory with the lighting fixtures which he developed to meet his particular requirements. A combination capillary and mazda and mercury-vapor and mazda fixture flanked by another large-size incandescent fixture with parchment diffusing shades provides from 300 to 600 ft.-candles of light on the desk top. Mr. Ray finds severe eye work for long periods is possible without strain under about 350 ft.-candles. Walls and ceiling are in a neutral tone.

For instance, Fig. 1 shows Mr. Ray in his office, where he has an experimental lighting installation giving between 300 and 600 ft.-candles on his desk top without glare. Walls, ceiling and Venetian blinds are a blue-gray tone. The ultra high-level, diffused lighting permits working with the eyes over long periods without fatigue. Fig. 2 shows an unused schoolroom where the tests were started. A lumber framework and a series of pulleys permitted vertical and horizontal movement of the fixtures. The assortment of paint cans indicates the scope of color investigations. It was from the work carried on here that the first experimental classroom shown in Fig. 3 developed.

This room is finished in a neutral blue-gray tone on walls, ceilings and desks. The writing board also is of this shade, which was proved to be the most restful to the eye, contrast for the writing on the board being obtained by yellow chalk. The Venetian blinds are blue-gray on the bottom side but white, for greater reflection, on the top. The lighting installation is almost incredible for a room only 23x31 ft. Twelve 300-watt, semi-indirect aluminum fixtures are arranged in a rectangle, there being five along the windows, five along the wall and one at each end between the two rows. The last seven fixtures are controlled from one photo-electric relay and the five nearest the window from a second relay. Both photocells are mounted on the side of the room next to the windows and arranged to pick up the reflected light from the dark side of the room. This installation provides a minimum of 40 ft.-candles on the desk top.

Also of interest is the method used

to insure the exact reproduction of data on subsequent tests. Metal markers were nailed to the floor at various points around the room where light readings were to be taken. By means of a special rack, constructed so that it would bring the sightmeter directly over each marker and always at the same height above the floor, readings with different combinations of light and color can be compared accurately. To facilitate switching of fixtures and to determine kilowatt-hour consumption records, a combination control and meter board is installed in one corner of the room. The contrast, presented by Fig. 4, which was the room before being modernized for efficient seeing and effortless study, is marked.

The philosophy behind these investigations has been proved correct. Education is largely a matter of reading; reading is a matter of seeing properly, and that, in turn, is a function of the illumination and attendant surroundings. By making the room and its contents a neutral color, comfortable on the eyes, the book the student is studying stands out in bold relief and there is little other contrast to distract the eye from its task. Similarly, experiments have shown that on dull days, in the early morning or late afternoon, when the light is poor, the students day dream or play. If the proper artificial illumination is turned on the class will immediately resume studying, showing that poor lighting

[*Continued on page 91*]

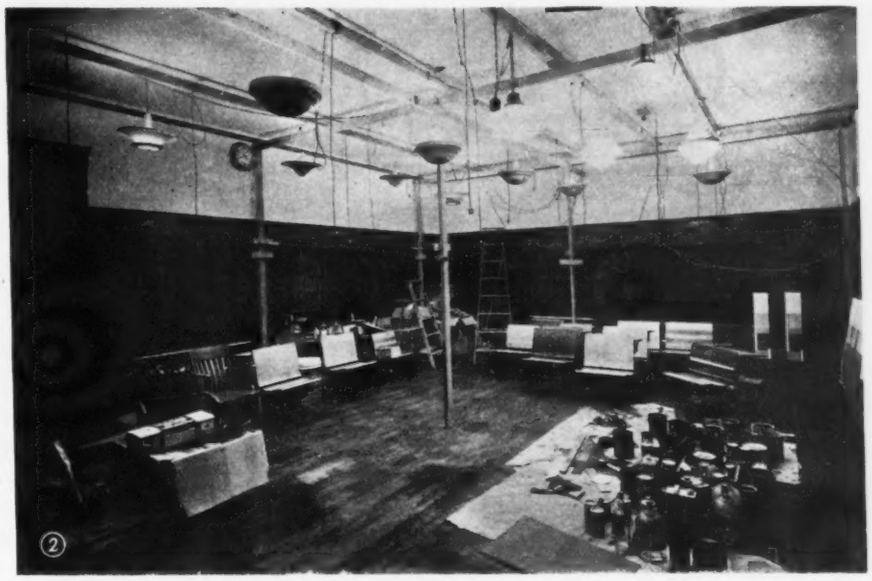


Fig. 2—Test classroom

This unused classroom was used for testing combinations of light and color. Arrangements provided both horizontal and vertical movement of the various fixtures under test and from these tests the recommendations were made which resulted in the classroom shown in Fig. 3.

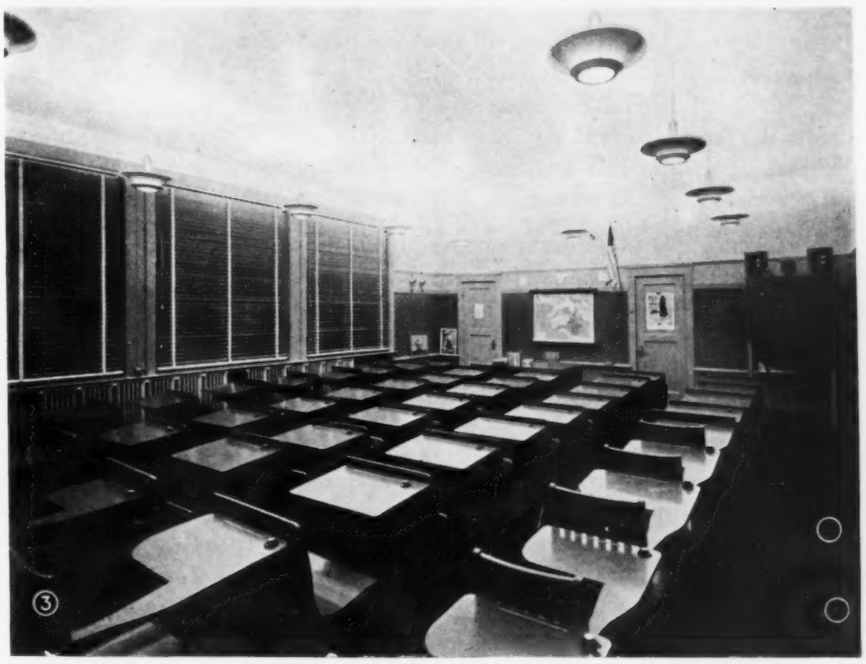


Fig. 3—40 foot-candles in modern classroom as developed in Sausalito schools

Walls, ceiling and desks are of a neutral, eye-resting, blue-gray tone. Even the familiar blackboard is modernized in blue-gray with contrasting orange chalk to give maximum visibility to writing thereon. Twelve 300-watt, semi-indirect fixtures (3.6 kw. of light) provided an even, minimum, intensity of 40 ft.-candles at desk height throughout the 23 x 31-ft. room. The photocell control of the lights is on the wall near the windows and is operated by the reflected light from the "dark" side of the room. Note the markers on the floor to insure all test readings will be made at the same points.

Fig. 4—Classroom before scientific lighting was applied

Only three 300-watt fixtures were used and much of their light was absorbed by the dark desks, woodwork and blackboard.

Editorials

Government Control of Power Plants

IN RECENT years there has been a trend toward increased government control of, and interference with, the operation of public utilities. While these efforts in the past have been directed toward financial and distribution problems, such control in some other countries has been extended to matters of generation, which includes power plant design and operation. It may, therefore, be of interest to note the nature and extent of such control of power plants.

In Great Britain the Electricity Commission controls the Grid, which is the interconnecting system of transmission lines that has been built to tie together the various generating stations, both municipal and privately owned. The Grid takes electricity in bulk from the generating plant and sells it in bulk to various local distributors. Naturally, it seeks to secure its bulk supply from the more economical stations. As a matter of fact, the initiation of the Grid led to the closing down of a large number of the small, uneconomical plants.

In order to regulate the supply to meet increasing loads, the commission controls the authorization of additions to plant capacity on the various parts of the Grid. This control of extensions includes approval of expenditures. Indirectly this has led, probably unintentionally, to the standardization of station operating pressures and temperatures and to the use of certain standard sizes of generators, which lead to certain obvious advantages.

On the other hand, there is a constant urge to give base loads to the high economical stations and to encourage the extension of such plants. A point is inevitably reached, however, where this increased output must be distributed over longer transmission systems and also where the interconnecting equipment will require extension to care for the increased load to be distributed. As a consequence, costs to the consumer may be greater than if a local supply only had been developed. It is not certain that the British commission has appreciably lowered costs to the consumer over former rates, though other advantages have accrued from the Grid.

Government control if extended may therefore impose unnecessary limitations on power station design and operation which in the end may not be advantageous to the consumer.

Appliance Payment Terms Shortening

RECENT statements in the daily press by heads of finance companies point to a reduction in the terms to be extended by these companies for the purchase of major appliances, particularly refrigerators. There is noticeable also in the sales programs now being prepared for 1938 a well-marked trend toward a reduction in terms, one set of which, for example, ran for 59 months.

In this connection it is of interest to note that the sales committee of the Edison Electric Institute points out in its recent report (E 13) that "the repossession ratio increases directly with the length of contract and inversely with the equity that the purchaser has in the appliance."

It would seem that utilities could well afford to consider the higher national income and increased ability to pay to the extent of revising terms on appliances.

•

No Power Shortage Unless—

WITH all the to-do about a "power shortage," a few simple facts should be emphasized. They are not technical. They can be readily understood by any intelligent citizen. There is no "power shortage" at present. There is no prospect of one in the immediate future. Certainly the American people do not want one.

All the recent discussion refers to a possible inadequacy of generating equipment to meet demands that may arise in one or several years, if loads continue to increase and if construction meanwhile does not fully anticipate the demands.

National totals and averages are merely a first approach to the question. They are important, but they settle nothing. This is a large country and conditions vary widely. Whatever needs may develop must be met locally, not by additions in some other geographical region. They cannot be met by the construction of water power plants by the federal government, because the critical areas will be the industrial East and North, while the great power sites are in the South and West, too far away to be reached by any practical system of transmission now known.

Private enterprise, however, will step forward—is stepping forward—to anticipate the rising demand, as it has done in the past. It will come into the market for hundreds of millions of dollars worth of material and labor, maintaining and increasing employment in mining, lumbering and unnumbered lines of manufacturing that make the things needed in electric systems.

Even so, it would be wrong to say that there can

be no power shortage, for one can be brought about. Hamper general industry and business, make it uncertain so that utilities cannot forecast the demand for power, badger the utilities so that they cannot readily raise the needed capital for new construction, and then, when the loads do pile up, the pinch may develop here and there, especially in our industrial areas. Then a power shortage will have been brought about, not by the utilities, but by those who would render futile the orderly processes of the utilities to prevent one.

It has been said, "Accidents do not happen, they are caused." The same applies to a "power shortage."

•

Why Not Larger Units for Capacitors?

EUROPE is using capacitors in much larger units and at higher voltages than we are using in our practice. Here we are pretty well committed to the habit of assembling the installations as aggregations of units of relatively small size (5 to 15 kva.) with each unit in a separate container. That practice undoubtedly had its origin in a rule of the underwriters which limits the amount of oil per container when used indoors. Even though this limitation no longer holds for the non-inflammable insulating liquids now frequently used in capacitors, the unit principle to which it led has been retained. It certainly can be said for the practice that it has great advantages from the point of view of flexibility, replaceability and interchangeability, as well as of standardized fabrication.

The trend toward installation of capacitors for other uses than mere power-factor correction and, instead of indoor industrial installation, toward pole and other outdoor mounting along lines raises a question. Are we not likely to see larger and larger capacitor installations on feeders and at tie points and does this not warrant analysis to determine the economics of the situation as to unit size?

Abroad they are housing large capacitors in single tanks that have all the appearances of transformer tanks, even in some instances to the inclusion of oil expansion tanks. Capacitor losses are so much less than in a transformer of equal volume that corrugations and built-on radiators are usually found unnecessary. Buchholtz gas-relay protection commonly supplants the fusible links that would be undesirable inside a tank.

Use of capacitors to promote tie-line continuity as described in this issue by E. H. Hoehn prompts this speculation as to trend of capacitor design as well as showing that capacitors are becoming useful for broader service than just power-factor correction or voltage regulation.

•

Dual Opportunity for Load Builders

THE public utility industry is moving into the budget-making days when it will set its course for 1938. As in every other industry, the final figure in the estimate of income and expense is the most interesting one—increased net earnings. To achieve this goal of higher net means a closer scrutiny of capacity and loads, and particularly nowadays of the new capacity and the new loads.

Management in 1938 will be seeking a more discriminating development of new load, load that can be shown to be profitable in the sense that its magnitude, location and occurrence characteristics are such that the revenue to be derived from it under the applicable rates will be commensurate with the new investment required to serve it. This is apparent from the many studies now under way in the industry which focus inevitably upon two basic considerations: (1) Where can we sell more kilowatt-hours per kilowatt; and (2) where can we secure more dollars of revenue per kilowatt.

The new trend may be seen most clearly, perhaps, in the domestic field, where increased attention is being given to lighting and small appliance load potentialities, which not only require a minimum of new investment but usually can be sold on the higher steps of the rate schedule. This means, of course, more selling to the low-use customer.

As for commercial loads, sales departments are in many cases analyzing present accounts, much as the residential accounts are being studied, and load-building activities here will be pointed to the same two basic objectives.

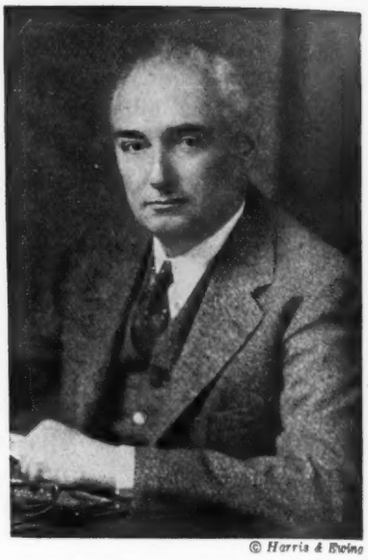
It is not so generally appreciated that behind the average commercial usage of 4,155 kw.-hr. and the average annual bill of $154 are a great many customers definitely in the small-use class, who can use more kilowatt-hours per kilowatt at the usually lucrative commercial rate and more than compensate for their present load factor.

To the load builder who thus seeks out the really profitable business available to his company the budget-making days just ahead present a dual opportunity. The first comes when the engineers bring in construction budgets, for then the sales organizaion points out prospective loads, profitable enough to justify the prospective capacity.

The second opportunity comes when the sales program is presented to the maangement, not merely as the 1938 total of appliance sales, not merely as a program is presented to the management, not merely as criminating development of new load, properly related to new capacity, to the end that management may be aided in securing the increased net earnings needed by the company as a whole in 1938.

7-TVA Set-up a Political Bonanza

By CARTER FIELD



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This noted journalist gives his personal comments and interpretations on current happenings affecting the electrical industry. His background and his location at Washington make his thoughts informative and interesting even though all may not agree with him

MANY years ago General Goethals, of Panama Canal fame, remarked that "all boards are long, narrow and wooden." He was thinking at the time of the first U. S. Shipping Board—that disastrous experiment in government shipbuilding and government ship operation which is costing the American taxpayers plenty to this day. He was thinking also of other boards and commissions with which he had been obliged to deal, as an engineer on practical problems, because, being an army engineer, he had to deal with political forces.

At the session of Congress to convene in January it seems likely now that the Norris 7-TVA's bill will become law. This will mean seven of these agencies which the practical and efficient Goethals found so devastating to real accomplishment, set up to "run," literally, seven huge areas of the United States.

Putting to one side all consideration of the comparative merits of government and privately operated utilities, let's consider the idea of intrusting all this power to seven bureaucratic type "soviets," politically appointed, politically appointing engineers, clerks and other underlings, with Civil Service (though heaven knows even that is nothing to brag about) thrown out the window, and with the further stipulation that no one not in sympathy with the purposes of the "act" shall have any position of responsibility.

Let's look at the "pattern" for these seven new commissions proposed in the bill of Senator George W. Norris —TVA itself.

That is a three-man commission. It's much easier usually for three men to get along together on a board or committee than for a larger number. But the maneuverings of these particular three men, their strivings to oust each other, to short circuit each other, to destroy each other's influence with the political force above them—the President—have made good newspaper copy ever since they were appointed.

The man who has come out on top, apparently, had two elements of strength which his chief opponent lacked. David E. Lilienthal agreed with the President's views on the power question and he had powerful friends on Capitol Hill, notably Senator Norris and Senator Robert M. La Follette. Politics.

Bad as it is and has been, however, politics has been less of a blight on TVA than it probably will be on each and every one of the additional seven to be created if the Norris bill goes through next session. This sounds like a dogmatic, prejudiced statement, but let's appraise it coldly.

Norris has been given the upper hand in TVA from its inception. It was always regarded, from way back in the Muscle Shoals days, as his baby. Now Norris is a very queer fish in politics. There just doesn't happen to be anybody else in high official life who plays the same sort of political game. For the very good reason that most people who have tried it do not last very long.

Norris is just about the only one of the 96 senators who doesn't *have to have* patronage. He never did bother about it. Through the years he has built up a devoted personal following in the comparatively small state of Nebraska which keeps re-electing him without need for a political machine or benefit of a party label.

Because of this strange situation, TVA has been less bothered by the necessity for political appointments than any other commission or board created under the Roosevelt Administration. And their name is legion.

Take a look at the Coal Commission, for instance. Eager patronage seekers in Congress provided early that all appointees outside of Washington—that is, outside the home office—should be exempt from Civil Service requirements. Which means that all the workers out in the field, where the practical work should be done, are political appointments.

Somewhat similar to the line-up in TVA—where Lilienthal obtains the vote of Harcourt A. Morgan by giving him a free hand on what interests him, thus stalemating Chairman Arthur E. Morgan—there is a combination of four in the Coal Commission. The division there is four to three. Charles F. Hosford, chairman, runs the commission and both representatives of the mine workers are in the minority of three!

Imagine how powerful political influence is when the mine workers, whose head, John L. Lewis, virtually forced this measure through two times —once before and once after its trip to the Supreme Court—are in the minority!

And the answer is political patronage. Hosford wanted to run the works. He cared little about patronage. C. E. Smith, former West Virginia publisher, wanted to make the appointments and cared little about interfering with Hosford's ideas of the main objectives.

[*Continued on page 90*]

News OF THE WEEK

Northwest Power Shortage Causes Curtailment In Mining Activities

Operators ask army engineers to slow work on Fort Peck Dam so that energy from Montana Power will be available for other operations — Dry weather and small snowfall blamed for water shortage

Forced curtailment of mining operations in the Northwest, because of a power shortage brought about by the heavy demands for power in the construction of the Fort Peck Dam in Montana, has resulted in numerous complaints from mine operators. Due to the critical stage of the work on the Fort Peck Dam army engineers report that they are not in a position to turn back any material proportion of the 40,000 kw. covered by their contract with the Montana Power Company.

Mining interests contend, in complaints to the chief of engineers, that they have been forced to close or curtail their activities due to the power shortage. This shortage of power is due to the exceedingly dry weather which has prevailed for the past eighteen months. The demand for power, both from the government in the construction of Fort Peck Dam and from mining interests, has been the highest in some time and has brought about a serious situation. Zinc operations have been curtailed as well as some copper activities.

Work on dam rushed

The Corps of Engineers points out that the dam must be pushed to a sufficient height during this season to insure it against washing out in the event of high water this winter. The Missouri River freezes around November 1 and at that time work on the dam comes to a standstill. It is not until spring when full operations can be resumed.

It is pointed out that the present power shortage is due principally to the light snowfall last winter. The Montana Power Company relies entirely on hydro-electric energy, but, through interconnections with Washington Water Power and Puget Sound Power & Light, has been supplying much of the present demand.

Montana Power has 194,000 kw. of installed capacity and has a demand for 70,000 kw. more than it can supply. The company is importing 40,000 kw. from Washington Water Power, which is about the capacity of its transmission line.

New Flathead plant

While rainfall has been above normal this year in the upper Missouri watershed, this did not make up for the deficiency in snowfall. The Missouri at Fort Peck has been higher this summer than last fall until the middle of August, when the stage went below a year ago.

Next June Montana Power expects to put into operation its Flathead plant, which has an installed capacity of 56,000 kw. and is capable of a 450,000,000-kw.-hr. output. When this plant is put into operation it is expected that the present power shortage will be corrected.

The Federal Power Commission is engaged at present in a survey of power supply throughout the Northwest. The situation is expected to have an important bearing on the decision as to when to install power-generating equipment at Fort Peck, a federal irrigation and power project.

Montana Power points out that the importance and value of power interconnections is illustrated by the present situation. Mining interests contend that if work on Fort Peck were slowed down there would be sufficient power available for mining operations.

•

Water Works Complies With Utility Measure

American Water Works & Electric Company, Inc., this week became the first major utility holding company to seek voluntary compliance with the "death sentence" of the Utility Act when it filed with the Securities and Exchange Commission an application for approval of a comprehensive plan for simplification of its system.

The utility proposes dissolution of its largest intermediate holding unit, West Penn Electric Company, and the consolidation of some of the operating properties in the system. It is proposed to issue bonds and stock of American Water Works & Electric, the proceeds to be used to redeem outstanding securities of West Penn Electric and the purchase of securities of other companies so as to effect the realignment of properties.

Hearing on the application was set by the SEC for September 14 in Washington. American Water Works & Electric has been working on the plan since it filed registration with the SEC last February. At that time North American Company also registered with the SEC under the Utility Act.

•

Scranton Rate Probe Ordered

Pennsylvania Public Utility Commission has ordered an investigation of rates charged by the Scranton Elec-

tric Company. Commissioner Richard J. Beamish announced the commission had ordered its bureau of accounts, rates and statistics to begin a study of the company's rates. A hearing before the commission will follow the study. If the commission finds the rates excessive, it will order temporary rates, Commissioner Beamish said.

•

Extension of Option Sought by Portland

Portland Ore., will formally seek extension of its option to purchase the properties of Northwestern Electric Company for an additional ten-year period, according to action taken last week. The option is a provision of the company's franchise expiring November 13.

Public ownership advocates appearing at the meeting last week expressed the belief that if the question of purchase was brought before the voters now it would fail by at least five to one. The Council made it plain that in seeking extension of the option it was seeking to protect the people's interest, in that a change of attitude might develop in the body politic in the light of future administration of Bonneville.

•

Rep. Pettengill to Retire; Was Utility Act Opponent

Representative Pettengill, Democrat, Indiana, announced this week that he would retire from Congress at the end of his present term. He said that he would not seek re-election next year, but would return to private law practice.

Mr. Pettengill will have served eight years at the expiration of the 75th Congress. He has opposed many Administration proposals. He made an outstanding fight in 1935 against the "death sentence" in the utility Holding Company Act.

•

Utilities' Valuation Fixed

Valuation of taxable properties of the Albuquerque Gas & Electric Company has been set by the New Mexico Tax Commission at $1,669,389, a decrease of $70,806 under the 1936 figure. Valuation of the New Mexico Power Company, a Santa Fe utility, was increased to $924,235 from $853,700 in 1936.

Federal Power Commission Plans Hearings Soon on Electric Rates

Study of "reasonableness" of charges for power and contracts of utilities seen as move to lower all rates — "Yardstick" may be revived to spur utility question as test suits move forward in court

A move to bring about a downward revision of power rates may be undertaken in the near future when the Federal Power Commission begins hearings on the "reasonableness" of charges. It is anticipated in some quarters that the commission is likely to move toward regaining public appeal for the electric rate "yardstick" which was so forcefully presented by the TVA, but which fell into disrepute when the public became aware of all factors which must be considered in utility operations.

The power commission has amassed an enormous amount of data on utility contracts for sale of power for resale and is now studying this information with a view to obtaining a broad picture of the power situation in the country when hearings are held.

Utility suit ready

It is anticipated in some quarters that the commission will have built up a public background before any action is taken. Some observers have expressed the opinion that the commission hearings may prove the opening of another barrage against the utilities. The nineteen-utilities suit against the TVA comes up in October and the Electric Bond & Share case against the utility act is also expected to be presented to the Circuit Court of Appeals early in the fall.

The power commission has been going ahead in administering the provisions of the utility act which come under its jurisdiction. Under the act the utilities are required to submit to the commission "schedules showing all rates and changes for any transmission or sale subject to the jurisdiction of the commission, and the classifications, practices and regulations affecting such rates and charges, together with all contracts which in any manner affect or relate to such rates, charges, classifications and services."

The recent appointment by President Roosevelt of John W. Scott of Indiana, former Department of Justice attorney in charge of PWA power cases, as a member of the FPC has brought forth expressions of opinion that the commission will take an aggressive stand in carrying out provisions of the utility act under its jurisdiction.

•

Kentucky Utility to Take Prompt Rural Line Action

Following approval of contracts between the Woodford County rural electrification committee and the Kentucky Utilities Company and the Kentucky-Tennessee Light & Power Company by the state Public Service Commission, Washington Reed, vice-president of the Kentucky Utilities Company, announced that after signing the necessary papers his company will be ready to begin building rural electric transmission lines within thirty days.

Sixty-five miles of lines on roads where surveys have been completed will be built at once and are expected to be finished by Christmas. Additional lines will be added as customers on new lines meet the conditions agreed upon—enough customers on a line to assure the utility companies a gross return of 1½ per cent per month.

•

Birdseye Cuts Lamp Prices

Reversing the cycle of rising prices, the Birdseye Electric Company has announced a radical reduction runing as high as 50 per cent (on some types) in the prices of Birdseye reflector lamps. The company explains that, despite rising labor and material costs and the largest backlog of orders in its history, increased production has made manufacturing economies possible. Production facilities are now being expanded to take care of both the present backlog and the increased demand expected as a result of the price reductions.

Georgia Power Sells 9,426 Units in Novel Merchandising Campaign

Rome leads in company sales of $909,830 of appliances which will use 10,308,420 kilowatt-hours and produce annual estimated revenue of $220,603 —"Cruise of Happiness" drive draws public appeal

Georgia Power Company recently brought to a close one of the most successful appliance sales campaigns it has ever undertaken. The technique employed in this campaign drew such wide public appeal that a new major appliance drive has been started which will run through September 20.

The customer enthusiasm created by the recent "Cruise of Happiness," which directed the housewife to chart her course to kitchen contentment with electrical appliances, is indicated by the fact that a total of $909,830 of merchandise was sold during the drive, which will result in an estimated annual revenue of $220,603 from the use of these appliances and total kilowatt-hour sales of 10,308,420.

Rome leads field

The final results of the appliance sales campaign in the six divisions, which finished in this order—Rome, Atlanta, Columbus, Augusta, Athens, and Macon—shows that 5,114 refrigerators, 2,419 ranges, 1,176 water heaters and 717 commercial refrigeration and air-conditioning units were sold. The company set a quota of 6,900 units and sold 9,426 units, or 136.61 per cent of quota. For the purpose of the campaign each $175 of commercial refrigeration, air-conditioning and water-cooling equipment was considered as a commercial unit.

The Georgia Power "flotilla" set sail on May 24 for 57 days on the "Sea of Sales" accompanied by an elaborate advertising and poster campaign. As the company stressed its campaign: "Advertising served as the pilot ship with a dynamic, attention-getting full page advertisement in fifteen daily newspapers throughout the territory announcing that the 'Cruise of Happiness' offered housewives a rich cargo of values, a new and richer way to complete happiness in the home."

In addition to the daily newspapers, 140 weekly newspapers also carried the story. More than 50,000 white sailor caps were distributed by salesmen and stores to children under twelve. Sailor caps were also given to each salesman to create interest in the campaign. Cash prizes were offered to salesmen. The entire campaign "smacked of the sea" with window and store decorations, colorful pennants and sea paraphernalia carrying the message. A large colorful map charted the course as sales quotas were approached and exceeded in every division.

F. J. Dodd and his Rome crew finished in first place, with J. J. McDonough and his Atlantans second, and M. E. Mann piloted Columbus to third place. W. H. Sharpe finished in first place among the "A" crew with 293.1 per cent of quota, trailed by J. L. Wray, 261.9 per cent; S. S. Pierce, 255 per cent; H. F. Manget, 253.06 per cent, and P. M. McMurray, 200 per cent. A. H. Cain won high honors among the main stores sales force. P. E. Talley was first in the "B" crew with 178 per cent of quota, while J. B. Warren was high in the "C" crew with 246.67 per cent of quota. Other divisions and district leaders included J. W. Wheeler in group "D"; C. G. Brantley, selling local managers; J. M. Hill, Atlanta commercial; W. F. Chestnutt, outside commercials, and J. R. Holt, division commercial senior salesmen.

The company offered the latest models of electric refrigerators, ranges and hot water heaters on terms of a small down payment and thirty monthly installments. The 85 offices of the company were elaborately decorated to attract customer attention and the success of the campaign is attested by the large number of appliances sold.

"CRUISE OF HAPPINESS"—One of the outstanding window displays of the Georgia Power Company during its recent appliance sales campaign which attracted wide consumer attention. Merchandise valued at $909,830 was sold during the 57-day drive

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Victor Chemical Works Plans to Run Plant on TVA Power

Construction of a $1,000,000 plant at Mount Pleasant, Tenn., which will be operated by power obtained from the Tennessee Valley Authority, has been started by the Victor Chemical Works of Chicago, according to August Kochs, president. The company owns about 3,500 acres containing phosphate rock deposits, from which it will obtain its raw materials.

The cost of the new plant, together with additions to the Nashville and Chicago Heights plants, will be financed through the sale of 75,000 shares of $5 par common stock.

Jourolmon Charged as Being 'Stooge' of TVA

Charges that Leon Jourolmon, Jr., a junior member of the Tennessee Railroad and Public Utilities Commission, is "little more than a stooge" for the Tennessee Valley Authority were made last week by Col. H. J. Weeks, petitioner for the coal industry. He declared that the industry is little surprised at the permission granted by the two other members of the commission to the Tennessee Electric Power Company for the construction of a $2,000,000 steam generating plant in Nashville.

In praising the majority opinion of Chairman Porter Dunlap and Commissioner W. H. Turner, Colonel Weeks said that "there has never been a time when this country needed men who could keep their feet on the ground and separate the wheat from the chaff in the evidence presented to them as have the majority members of the Tennessee Railroad and Public Utilities Commission in their decision of the 14th.

"The actions of Mr. Jourolmon from the very beginning have demonstrated to any fair-minded person his bias and prejudice, and his minority decision, based as it is on questionable information outside the evidence, proves conclusively that no appellant to the Railroad and Public Utilities Commission can hope to obtain his vote on any matter requiring an exposition of sound common sense."

Colonel Weeks charged Mr. Jourolmon with bias and prejudice, and said that "from his statement and interrogation of witnesses throughout the hearing showed that he had prejudiced the case, and now his decision indicates that he is little more than a 'stooge' for the TVA."

Colonel Weeks pointed out that the National Resources Committee, headed by Secretary Ickes, in its report to President Roosevelt concluded that a steam power plant was more economical than electrical energy developed from water power.

•

Co-operative Plans Plant

Maryland Public Service Commission plans to hold a public hearing September 7 on the application of the Southern Maryland Tri-County Co-operative Association, Inc., for authority to construct its own plant for the generation of electric energy at Pope's Creek, Charles County. The Co-operative also seeks authority to borrow not more than $50,000 from REA to carry out the project. When organized some time ago it planned to purchase its energy from the Maryland Light & Power Company.

•

New Cornell-Dubilier Issue

The unsold balance of the 60,828 common shares of the Cornell-Dubilier Electric Corporation recently offered to stockholders of the Dubilier Condenser Corporation and the Cornell Manufacturing Company, Inc., was offered to the investing public last week at $10.75 a share. Proceeds of the issue are to be used for the acquisition of the entire capital stock of Condenser Corporation of America, for the retirement of preferred stock and dividend notes, and for additional working capital.

•

Against Municipal Ownership

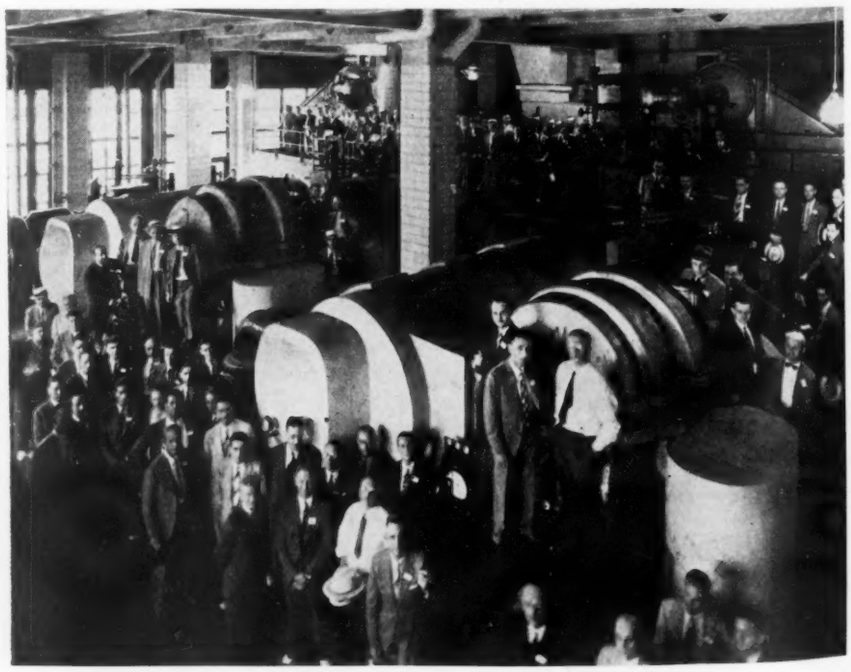
Senator Royal S. Copeland, who is entered in both the Republican and Democratic primaries for nomination for Mayor of the city of New York, said this week that he was for strict regulation of utilities, but opposed to municipal ownership of them.

"Fix-It" Truck Put in Service in Utah

Ten thousand residential and farm customers in the widely scattered Provo division of the Utah Power & Light Company will be contacted in the next few months by trained employees attending a "fix-it" truck for the purpose of discovering electrical appliances not in use for want of repair and placing them immediately in order.

A staff of four men, dressed in immaculate white uniforms with a "Reddy Kilowatt" emblem on coat and cap, who man the truck, will stop at each customer's home, bring to the truck those appliances with burned-out heating elements, frayed cords, loose connections or any one of a hundred defects, and at the same keep a wary eye open for possible new appliance prospects. Repair service is gratis, a charge being made only for parts which may be drawn from stock.

In order to make this roving service possible, a special truck was constructed, the equipment consisting of front and end interior workbenches, test panel, tools and repair parts for a skilled mechanic's use. The rear and entire one side of the truck is attractively arranged for the display of merchandise. Enthusiastic reception



CARRIER CONFERENCE—Engineers of the Carrier Corporation inspecting centrifugal refrigeration installation during the recent three-day conference. Willis H. Carrier, chairman, outlined developments in the air-conditioning field

has been given the truck in its first weeks of operation, Division Manager George Ellerbeck states. Sales Manager Huckins, under whose general direction the novel service is offered, plans similar trucks for other major Utah Power districts.

•

Electric Truck Sales Show Sharp Gain in Seven Months

Shipments of electric industrial trucks and tractors totaled 1,076 units during the first seven months of 1937, exceeding by 65 per cent the number in the like period of 1936, and more than doubling those of other recent years, according to statistics announced by the Bureau of the Census based on reports from ten manufacturers, representing the entire industry. Corresponding figures were 652 in 1936, 430 in 1935 and 397 in 1934.

Shipments during July, 164 units, show similar gains compared with 113, 76 and 29, respectively, in the earlier years. Total shipments since the beginning of 1934 aggregate 3,842 units, of which 232 were for export. New orders are exceeding shipments—192 in July, 1,199 in the seven-month period.

•

Plans New Financing

New financing will be undertaken by the Northern States Power Company next year, it was indicated last week by Robert F. Pack, president, during his appearance before the Securities and Exchange Commission in connection with an application to reclassify 275,000 shares of no par value $5 preferred stock into an equal number of preferred shares convertible into common stock at the option of the holder. Mr. Pack also indicated that the company might do some temporary financing through banks earlier.

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Meter Ordinance Repealed

A three-year legal battle has been ended by action of the Flint (Mich.) City Commission in repealing two ordinances which sought to assess electric meter fees against the Consumers Power Company. The ordinances were enacted in 1934, but no fees were ever collected when the company took the matter into federal court. The fee set up in both ordinances was 15 cents per month for each meter.

PWA Makes Additional Allotment to Virginia Hydro Power Project

Grant of $200,000 to match $250,000 raised by Danville to complete construction of Pinnacles development — Project to cost $3,855,454, of which PWA is contributing $1,529,954 in form of outright grant

Assurance of the completion of the Pinnacles hydro-electric development of Danville, Va., was given this week when the Public Works Administration made an additional grant of $200,000 to match $250,000 which the city had previously raised. The project is the largest electric power development in the state.

The PWA announced that the allotment makes possible the construction of the Big Bend reservoir, which is essential to complete the project. Without it, it was said, the storage reservoir plans would have had to be abandoned and the plant would have been operated as a run-of-the-river plant. The existing steam plant would have to be revamped to supply the deficiency in the anticipated volume of power from the hydro-electric plant.

Retain steam plant

The Pinnacles project consists of two dams, a power house, more than 60 miles of 132-kw. transmission lines, three substations and a complete distribution system. Water is to be stored in reservoirs behind the dams and released as required. Lines from the project will tie in with the existing municipally owned electric system. The present city-owned steam-electric generating plant is to be retained as a reserve source of power.

Construction was started on the project in November, 1935, and it is expected that power will be delivered to the city of Danville before 1938. The total estimated cost of the project is now $3,855,454, of which the PWA is contributing $1,529,954 in the form of an outright grant.

The PWA stated that in addition to the hydro-electric development at the Pinnacles and the renovation of the old steam-generating plant at Danville the PWA allotted funds to the city to aid in financing the construction of extensions to the city-owned electric distribution system. Work on the rural lines was completed in May, 1935, at a cost of $18,000, of which PWA provided $5,500.

New York Is First in Air-Conditioning Load

With a connected load of 84,500 hp. at the first of the year, New York leads the United States and the world in the size of its air-conditioning load, according to a recent survey by the Consolidated Edison Company of New York, Inc. Chicago, with a connected load of 58,500 hp., is second; Washington, D. C., with 39,500 hp., 25,000 hp. of which is used in federal buildings, is third, the survey shows.

While New York is first in size of air-conditioning load, it is second to Chicago in number of installations, Chicago having 1,370 at the beginning of the year, as against 1,300 for New York, the survey indicates.

Air-conditioning load for the four boroughs served by the Consolidated Edison System has increased 300 per cent over 1930, the survey shows. Industrial air conditioning, with a total connected load of 4,500 hp., shows a more than 200 per cent increase over 1930.

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Merger In Missouri Sought

Federal Power Commission has ordered a hearing held on September 8 on an application by the Missouri General Utilities Company and the Twin City Light & Power Company, both subsidiaries of the Associated Gas & Electric Company, for approval of the sale of the franchises and all of the property, including the capital stock, of the latter to the former company.

•

Plastic Sales Group Moves

General Electric Company has announced the removal of the plastic sales division from Bridgeport, Conn., to Pittsfield, Mass.

Labor Largest Item in Expense of Utility

Labor represents the largest single annual expenditure made by Consolidated Edison Company System, with taxes running second, according to Ralph H. Tapscott, president of Consolidated Edison Company of New York, Inc.

Writing in the August issue of the company's employee magazine *Around the System*, Mr. Tapscott stated that it takes about $30,000 to set up the average employee of the system in a job and give him the tools to work with and that in 1936 the average employee received $1,870 in wages. Wages this year will be higher, because of pay adjustments and increases.

With revenues of the system totaling $235,214,134, or $5,475 per average employee last year, it can be seen, Mr. Tapscott said, that the companies must operate for more than five years before it takes in an amount equivalent to the $30,000 investment per average employee. The investment is $5.36 for each dollar of annual revenue.

If the revenue dollar was split, Mr. Tapscott said, wages would comprise 29.72 cents, taxes 19.30 cents, supplies and miscellaneous expenses 18.19 cents, interest charges and subsidiary preferred dividends 8.69 cents, depreciation 8.20 cents, preferred stock dividends and minority common stock dividends of affiliated companies 7.36 cents, preferred stock dividends of Edison 4.46 cents, and 4.08 cents to surplus.

Mr. Tapscott said that the return on an investment of $5.36 is but 4.6 per cent return for the year.

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A. B. Chance Buys Tips Tool

Tips Tool Company, Taylorville, Ill., has been recently purchased by the A. B. Chance Company, Centralia, Mo. At the present time Tips Tool is operating from the A. B. Chance factory in Taylorville.

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Promotes Modernization

The air-conditioning division of Gar Wood Industries, Inc., is organizing a staff of special salesmen and heat-survey men to foster the installation of automatic heating and air-conditioning equipment in homes already built and suitable for such modernization, according to a statement by Frank H. Dewey, general manager of the air-conditioning division.

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Westinghouse Builds Large Turbine Rotor

The most massive single-piece turbine rotor ever manufactured by Westinghouse Electric & Manufacturing Company is being "bladed" at the company's South Philadelphia plant. The rotor, a giant hub of solid forged steel, is more than 20 ft. long and about 5.5 ft. in diameter and has a speed of 1,800 r.p.m.

The turbine is being built for the Quindaro power station, Kansas City, Kan., and will drive a 30,000-kw. Westinghouse generator. It will operate on 400 lb. per square inch steam pressure and a total temperature of 725 deg. F. Forging for the rotor of the turbine was made by the Bethlehem Steel Company and required a 92-in. ingot, weighing about 293,000 lb. It weighed approximately 109,000 lb. when delivered to Westinghouse in rough-machined form.

The steam turbine rotor will be connected directly to the generator rotor, which will weigh approximately 75,000 lb. and the weight of the total finished rotating element of the turbo-generator will be approximately 91 tons.

Chicago Sets Record in Air Conditioning

Chicago air-conditioning contracts closed in July set a new all-time record, according to Commonwealth Edison Company.

A total of 141 contracts were closed, as against 112 a year ago, a gain of 26 per cent. Aggregate capacity of installations was 906 hp., compared with 745 hp. in July last year, a gain of 20 per cent.

The company stated that sustained hot weather the early part of last month resulted in a sharp increase in the sale of electric room coolers. Of the air-conditioning contracts closed in July, 97 were for room coolers, as against 64 a year ago.

There were a total of 1,838 air-conditioning installations in service or under contract in Chicago at the end of July.

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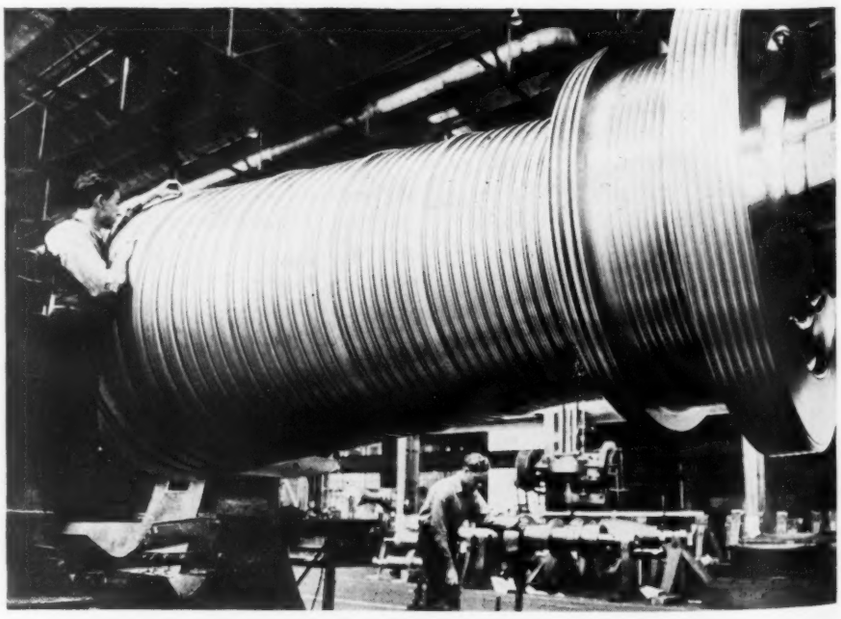
Transmission Link Finished

Completion of the first three units linking transmission lines of the South Carolina Electric & Gas Company and the South Carolina Power Company has been announced by the South Carolina Public Service Commission. The link is part of a joint building program which will cost more than $750,000.



HUB FOR A "STEAM WINDMILL"—This rotor for a steam turbine, now being "bladed" at the South Philadelphia Works of Westinghouse Electric & Manufacturing Company, is machined from a single steel forging, and when completed will be the heaviest single piece turbine rotor yet made by the company. It is being manufactured for the Quindaro power plant, Kansas City, Kan.

Rural Construction Contracts Awarded

Construction contracts covering rural electrification projects in various states have recently been awarded as follows:

GEORGIA—Upson County Electric Membership Corporation, Thomaston, has awarded contract to John Onan, Jr., Nashville, Tenn., to build 65 miles of line to serve 368 customers in Upson county. Taylor County Electric Membership Corporation, Reynolds; to Aldrich Electric Company, Augusta; 51 miles; 171 customers in Taylor county.

IOWA—Benton County Electric Co-operative Association, Vinton; to Elkhorn Construction Company, Norfolk, Neb.; 187 miles; 500 customers in Vinton county. Wholesale power will be supplied by Iowa Electric Light and Power.

MINNESOTA—Anoka County Cooperative Light and Power Association, Anoka; to John P. O'Neil, Faribault; 168 miles; 510 customers in Anoka, Ramsey, Washington, Hennepin, Sherburne and Isanti counties.

MISSOURI—Ralls County Electric Co-operative Association, New London; to Federal Engineering Construction Company, Kansas City; 287.5 miles; 900 customers in Ralls, Monroe, Marion, Audrain and Pike counties. Power will be supplied by Monroe municipal plant.

MONTANA—Missoula Electrification Association, Helena; to Charles Shannon, Butte; 61.35 miles; 194 customers in Missoula and Ravalli counties. Lower Yellowstone Rural Electrification Association, Sidney; to Manning & Noyes, Hysham; 92.8 miles; 297 customers in Richland and Dawson counties, Montana and McKenzie county, North Dakota.

NEW JERSEY—Sussex Rural Electric Co-operative, Newton; to Day & Zimmermann, Philadelphia; 126 miles; 321 customers in Sussex county.

OHIO—Muskingum Valley Farm Bureau Electric Cooperative, Coshocton; to Monroe Electric Company, Chicago; 122.5 miles; 370 customers in Coshocton county. Power will be supplied by Central Ohio Light & Power. Morrow Rural Electric Co-operative, Inc., Mt. Gilead; to Paul T. Gilmore, Columbus; 215 miles; 635 customers in Morrow, Knox, Richland and Delaware counties. Tri-County Rural Electric Co-operative, Inc., Wauseon; to Davis Hydaker Company, Spencerville; 160 miles; 400 customers in Fulton, Henry, Wood and Lucas counties.

TEXAS—Hill County Electric Co-operative, Itasca; to W. E. Callahan Construction Company, Dallas; 289 miles; 586 customers in Hill, Ellis and Johnson counties.

VIRGINIA—Shenandoah Valley Electric Co-operative, Harrisonburg; to Rockingham Construction Company, Harrisonburg; 357.85 miles; 1,511 customers in Augusta, Rockingham, Shenandoan, Frederick and Page counties. Over 82 miles of poles already erected on 125-mile first section of project. Power will be supplied by generating plant to be built with REA funds.

OKLAHOMA—Kay County Electric Co-operative, Newkirk; to W. E. Callahan Construction Company, Dallas, Texas; 282.45 miles; 740 customers in Kay, Noble and Grant counties. Power will be supplied by the Blackwell municipal plant.

WISCONSIN—Taylor County Electric Co-operative, Medford; to L. G. Arnold, Inc., Eau Claire; 230 miles; 659 customers in Taylor, Clark and Marathon counties.

•

Merger Hearing Postponed

Federal Power Commission has postponed until September 29 the hearing scheduled for August 23 on the application of the Pennsylvania Electric Company and the Pennsylvania Edison Company for approval of the sale of the franchises and all of the property of the former company to the latter company.

Postponement was made at the request of counsel for the applicants. Both companies are affiliates of the Associated Gas & Electric System.

•

New Plant to Add 10,000 hp.

Immediate start will be made on construction of a $1,000,000 power plant at the mouth of the Montreal River in Ontario to develop 10,000 hp., Hon. Peter Heenan, Minister of Lands and Forests of Ontario, has announced. Work is to be completed within twenty months, according to the government's arrangement with the Great Lakes Power Company, Ltd. A 10,000-hp. development was completed by the company last December at Montreal Falls.

•

$12,935,000 Issue Offered

Quebec Power Company has recently issued first mortgage and collateral trust sinking fund bonds to the amount of $12,935,000 at $98.50 and interest to yield about 4.10 per cent. Proceeds from these 25-year, 4 per cent, series C bonds will be applied to the redemption on September 1 of the series A bonds and registered debenture stock and the series B bonds heretofore issued and now outstanding. The balance of funds required for this purpose will be supplied from the company's own resources.

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TVA Power for Jackson, Tenn.

Jackson, Tenn., has signed a contract with the Tennessee Valley Authority permitting the resale of TVA power for all purposes, in competition with the West Tennessee Power & Light Company.

Power Board Extends Directorate Inquiry

Widening the scope of its investigation into the interlocking directorate structure of the Associated Gas & Electric System, the Federal Power Commission has ordered three additional officials of the system to show cause at a hearing on September 20 why their applications to hold positions with various utilities of the Associated group should not be denied. They are Ralph D. Jennison, Thomas W. Moffat and Martin J. O'Connell, all of New York. In addition, Mr. Jennison was ordered to show cause why his authorizations to hold offices with other companies should not be terminated.

Previously ordered to appear for the hearing were Thomas H. Blodgett, Fred S. Burroughs, Charles A. Dougherty, Eben T. Edmonds and Sanford J. Magee.

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Senate Confirms McNinch

The Senate has confirmed the nomination of Frank R. McNinch to be chairman of the Federal Communications Commission.

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Cutler Hammer to Vote

Stockholders of Cutler Hammer, Inc., on Sept. 2 will vote on the issuance of $2,500,000 in convertible preferred stock and a two-for-one split in the common stock. Funds to be derived from the sale of the preferred stock will be used for payment of $600,000 of bank loans and for additional working capital.

•

CIO Loses at Westinghouse

By a vote of 680 to 385, the employees' association of the Westinghouse Electric & Manufacturing Company small motor plant at Lima, Ohio, defeated the United Electrical & Radio Workers Union, a CIO affiliate, in a recent NLRB election.

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G.E. Patent Suit Dismissed

Suit by the General Electric Company charging infringement of its patents by the "Silver Swan" and "Lindberg" desk fans made by the Emerson Electric Company was dismissed with costs for the defendant by Judge Campbell in U. S. District Court at Brooklyn.

Convention Program Announced by I.E.S.

The thirty-first annual convention of the Illuminating Engineering Society will be held at the Greenbrier Hotel, White Sulphur Springs, W. Va., from September 27–30. Papers of outstanding excellence will be presented and an opportunity for frank discussion of timely topics will be afforded.

For the first time there will be held this year a session devoted to home lighting, dealing with the problems encountered by home-lighting advisers in public utilities. The program, which is a part of the National Lighting Sales Conference, will offer the latest information in this field. The National Lighting Sales Conference will be devoted to a discussion of the problems of utility lighting salesmen and allied enterprises.

The committee on lighting service will exhibit this year's entries in the Augustus D. Curtis Award and the prize-winning drawings in the 1937 I.E.S.-Beaux-Arts Prize Award Contest will be shown by the I.E.S. prize committee.

The convention committee has planned a most spectacular and unusual presentation of outdoor illumination, using the new types of light sources, which will offer opportunity for a study of future possibilities in this direction.

•

Joint Meeting to Be Held

Arrangements have been completed for a joint engineers meeting to be held on October 9 during Anthracite Week in Scranton, Pa. It will be sponsored by the local sections of the American Institute of Mining and Metallurgical Engineers, the American Institute of Electrical Engineers, the American Society of Mechanical Engineers and the Chambers of Commerce in the anthracite field.

Among the speakers will be Philip Sporn, vice-president and chief engineer American Gas & Electric Company.

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Higher Condensing Unit Sales

Rapid development of air conditioning and the expansion of the market for commercial refrigeration will lead America into spending approximately $20,000,000 this year for non-domestic condensing units, according to an estimate made by A. H. Reinach, sales manager of Kelvinator's standard commercial and liquid cooling department. Last year sales for this equipment totaled $12,400,000 and in 1935 sales were less than $3,000,000, Mr. Reinach said.

Meetings

American Institute of Electrical Engineers—Pacific Coast convention. Spokane, Wash., August 30-September 3. Middle Eastern District, Akron, Ohio, October 13-15. H. H. Henline, national secretary, 33 West 39th St., New York, N. Y.

National Association of Railroad and Utilities Commissioners—Annual convention, Salt Lake City, August 31-September 3. Clyde S. Bailey, secretary, Earle Building, Washington, D.C.

Pennsylvania Electric Association—Annual convention, Bedford Springs Hotel, Bedford, Pa., September 8-10. Harold A. Buch, secretary-treasurer, Telegraph Building, Harrisburg, Pa.

Maryland Utilities Association — Annual convention, George Washington Hotel, Ocean City, Maryland, September 10-11. E. J. Roche, secretary, 55 E. Washington St., Hagerstown, Md.

Rocky Mountain Electrical League — Annual meeting, Estes Park, Colo., September 13-15. George Lewis, managing director, Gas and Electric Building, Denver, Colo.

Wisconsin Utilities Association—Transportation section convention, Lawsonia Hotel, Green Lake, Wis., September 13 and 14. Accounting section convention, same place, September 24 and 25. A. F. Herwig, executive secretary, 135 West Wells St., Milwaukee.

Empire State Gas and Electric Association — Annual meeting, Saranac Inn, Saranac, N. Y., September 16-17. George H. Smith, secretary, Grand Central Terminal, New York, N. Y.

American Transit Association — Annual convention, White Sulphur Springs, West Va., September 19-23.

Illuminating Engineering Society—Annual convention. Greenbrier Hotel, White Sulphur Springs, W. Va., September 27-30. A. D. Cameron, general secretary, 51 Madison Avenue, New York, N. Y.

International Association of Electrical Inspectors—Annual Meeting, eastern section, Hartford, Conn., September 27–30. Joseph P. Rohan, general chairman, Hartford Building Department, Hartford, Conn.

Iron and Steel Exposition—Sponsored by the Association of Iron and Steel Engineers, Stevens Hotel, Chicago, Ill., September 28-October 1. Brent Wiley, managing director, Empire Building, Pittsburgh, Pa.

Chicago Exposition of Power and Mechanical Engineering — International Ampitheatre, Chicago, Ill., October 4-9.

International Association of Electrical Leagues—Annual convention, New York, N. Y., October 6 and 7. O. C. Small, secretary, 155 East 44th St., New York.

Electrochemical Society — Fall meeting, St. Louis, Mo., October 13-16. Colin G. Fink, secretary, Columbia University, New York, N. Y.

National Electrical Wholesalers Association — Semi-annual convention, Hotel Cleveland, Cleveland, Ohio, October 18–21. Alfred Byers, secretary, 165 Broadway, New York, N. Y.

National Electrical Manufacturers Association — Annual convention, Palmer House, Chicago, October 24-30. W. J. Donald, managing director, 155 East 44th St., New York, N. Y.

I.A.E.I. Makes Plans for Eastern Meeting

Plans are well under way for the annual meeting of the Eastern section of the International Association of Electrical Inspectors to be held in Hartford, Conn., September 27-30. A well-rounded program is being planned, with speakers of national prominence in the electrical industry included in the four days' activities. L. W. Going, president of the International Association of Electrical Inspectors, will address the convention and President A. R. Small of the Underwriters Laboratories, long a leader in developing the electrical code, will also deliver an address.

S. J. Rosch, chairman of the N.E.M.A. committee on wire insulation research, will be on the program. Joseph P. Rohan, chief electrical inspector Hartford Building Department, has been named general chairman of the convention.

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Commercial Group Moves

Headquarters of the commercial organization of the Pacific Power & Light Company, Portland, Ore., have been moved to Yakima, Wash. Department heads formerly having offices in Portland and moving to Yakima under the new arrangement are D. B. Leonard, commercial manager, and Guy E. Davis, domestic sales supervisor. Executive offices remain in Portland. Yakima is one of the largest districts of the company and this move is designed to place the commercial department closer to the customers with whom it is dealing.

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British Industrial Handbook

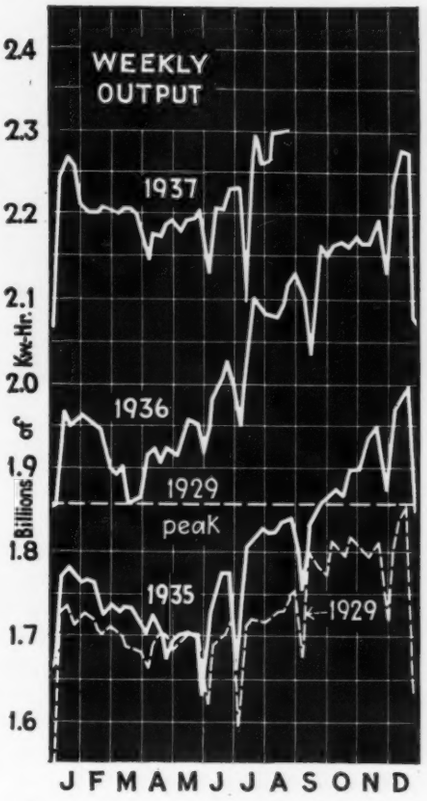
For manufacturers who are considering the establishment of factories in Great Britain, a handbook giving preliminary information has been compiled by the Travel and Industrial Development Association of Great Britain and Ireland. In compact form, it gives data on the market, national income, transportation facilities, banking and finance, on health, pension and employment insurance, tariffs, wage rates in various occupations. Copies are obtainable from the association at the British Empire Building, Rockefeller Center, New York City.

Output Holds Recent Gains

Energy production shows slight gain over previous record—Up 10 per cent over 1936

Although nominally a new all-time record energy output was established by the electric light and power industry during the week ended August 21, with a total of 2,304,032,000 kw.-hr. reported by the Edison Electric Institute, the increase over last week's record was only 3,485,000 kw.-hr. and too minute to have any significance other than indicating continuance of the past four months rising trend.

The gain over a year ago was 10.0 per cent, which varies but slightly from the figure of a week ago of 10.6 per cent. Regional gains are, with the single exception of the Rocky Mountain region, slightly under those of a week ago. The gain in the Rocky Mountain region evident over the past two weeks seems indicative of increasing mining activity. The increase in the West Central region dropped considerably this week from its previous position. Recessions in other regions were slight.



Per Cent Change from Previous Year

Region	Week Ending Aug. 21	Aug. 14	Aug. 7
New England	+ 5.3	+ 7.2	+ 6.5
Middle Atlantic	+ 6.8	+ 9.0	+ 7.4
Central Industrial	+12.3	+14.0	+12.0
West Central	+ 0.9	+ 4.1	+ 7.1
Southern States	+ 7.5	+ 9.8	+12.7
Rocky Mountain	+20.2	+16.7	+12.9
Pacific	+ 8.1	+ 8.9	+ 7.9
United States	+10.0	+10.6	+ 8.8

Weekly Output, Millions of Kw.-Hr.

1937		1936		1935	
Aug. 21	2,304	Aug. 15	2,094	Aug. 17	1,832
Aug. 14	2,301	Aug. 8	2,079	Aug. 10	1,819
Aug. 7	2,262	Aug. 1	2,079	Aug. 3	1,821
July 31	2,256	July 25	2,088	July 27	1,824
July 24	2,259	July 18	2,100	July 20	1,807
July 17	2,298	July 11	2,030	July 13	1,766
July 10	2,096	July 4	1,956	July 6	1,655

British Electrical Makers Report Increase in Orders

British electrical equipment manufacturers generally report that the turnover has increased so sharply this year and selling prices have been so well maintained that net profits will show considerable expansion.

The index of new orders, both foreign and domestic, is now 23 per cent above the average level of 1929. It is understood that order books are well filled both in respect of domestic and export demand.

•

Bids for Auxiliary Unit

Bids will be received about September 20 for the construction at Grand Falls, Tex., of an auxiliary electric power plant to the main electric generating plant of the Red Bluff dam and irrigation project, according to U. Stephens, chief engineer examiner of the State Public Works Administration office. The auxiliary plant will be located on the north bank of the Pecos River and will be used during the four months of the year when the main plant at the dam will not be operated because of the lightness of the power load.

•

Iowa Electric Light & Power Gets Large Franchise Vote

Satisfaction with private utility services appears clearly in the recent vote on renewal of the electric and gas franchises of the Iowa Electric Light & Power Company at Marshalltown, Iowa. The vote was practically twelve to one in favor of renewal, being 2 810 for and 239 against on the electric franchise and 2,773 for and 234 against on the gas.

This result is in line with the sixteen to one decision in favor of the company which was given by the voters of Cedar Rapids some weeks ago.

•

Power Output in Britain Shows Increase for July

Authorized undertakers in Great Britain generated a total of 1,588,000,000 kw.-hr. during July, as against revised 1,403,000,000 kw.-hr. a year ago, an increase of 13.2 per cent.

During the first seventh months this year output totaled 12,810,000,000 kw.-hr., as against revised 11,295,000,000 kw.-hr. in the same period last year, a gain of 13.4 per cent.

•

Electric Consumption Up

A 15 per cent increase in consumption of electric power by domestic, commercial and industrial consumers has been reported by the Tennessee Public Service Commission for 1936 as compared with the preceding year.

•

Ohio Power Awards Contract

Ohio Power Company, a subsidiary of American Gas & Electric Company, has awarded a contract to the Rust Engineering Company of Pittsburgh for a boiler house, auxiliary switch room and transformer structure to be erected at Power, W. Va., as part of a $3,000,000 improvement program. New high-pressure boilers will replace existing low-pressure units.

•

Wincharger Breaks Record

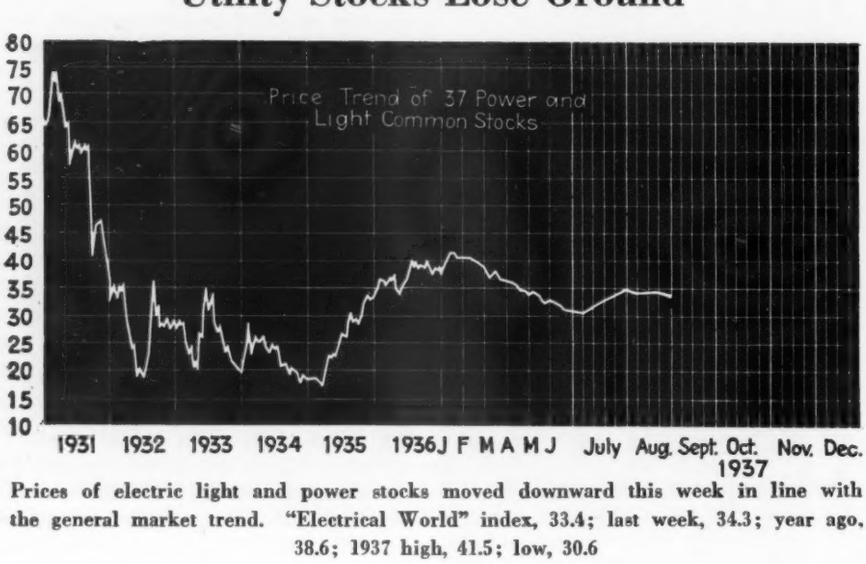
The Wincharger Corporation, manufacturer of wind-electric equipment, has announced that in the 30-day period ended August 15 unprecedented sales of its 32-volt "Giant Winchargers" were made. More than 2,100 units were sold during that period. Included in this figure were a great many "Giant Winchargers" which were shipped to foreign countries.

•

Output in Connecticut Up

Four principal Connecticut electric utility companies sold 656,254,000 kw.-hr. the first seven months of 1937, as compared with 558,619,000 kw.-hr. for the corresponding period of 1936.

Utility Stocks Lose Ground



Prices of electric light and power stocks moved downward this week in line with the general market trend. "Electrical World" index, 33.4; last week, 34.3; year ago, 38.6; 1937 high, 41.5; low, 30.6

Consolidated Edison Extends Stock Plan

The Public Service Commission this week extended to October 1 the period within which holders of preferred stock of New York Steam Corporation may assent to the plan of exchanging their stock for that of Consolidated Edison Company of New York, Inc. The company had previously set September 1 as the latest date on which the exchange could be effected. However, because many stockholders were away on vacation and the deposits so far so small, the company petitioned the commission for permission to extend the deadline.

The commission had approved the exchange of one share of Edison $5 preferred for each share of Series A preferred of New York Steam and nine-tenths of a share of Edison for each share of $5 preferred of New York Steam.

Holders of approximately 30 per cent of Steam Series A preferred and 22 per cent of $6 Steam preferred have thus far deposited their shares for exchange.

•

Merger Agreements Approved

The New Jersey Utility Commission has approved seven agreements for mergers of electric power and gas companies. They include the New Brunswick Light, Heat & Power Company, Gas & Electric Company of Bergen County, South Jersey Electric, Gas & Traction Company, Bordentown Electric Company, Cinnaminson Electric Light, Power & Heating Company of Riverton and the Paterson & Passaic Electric & Gas Company, all into the Public Service Electric & Gas Company, and the Orange Gas Light Company into the Newark Consolidated Gas Company.

•

Modified Plan Filed for Standard Gas

Modifications of the amended plan of reorganization of Standard Gas & Electric Company which was filed in the United States District Court for the District of Delaware on May 17, 1937, were filed in the court last week, according to a statement by Bernard W. Lynch, president of the company.

The modified plan filed provides for an extension of the $24,649,500 of notes which were due October 1, 1935, to a date ten years from the consummation of the modified plan and makes possible a reduction of the entire funded debt, consisting of $73,649,500 6 per cent notes and debentures, to $36,824,750, bearing 4½ per cent interest.

Holders of the company's $73,639,500 of 6 per cent notes and debentures are given the option either to retain their present securities or exchange each $1,000 principal amount thereof for $500 principal amount of a new 4½ per cent sinking fund debenture due in 25 years, plus 25 shares of the common stock of Philadelphia Company, two shares of the common stock of San Diego Consolidated Gas & Electric Company (after a four for one reclassification of the last-named stock). There will be attached to each $500 principal amount of the new 4½ per cent sinking fund debentures a warrant to purchase ten shares of common stock of Philadelphia Company at $15 per share for ten years after issuance.

Under the modified plan there will be no change in the prior preference stock, of which 368,348 shares of $7 cumulative and 100,000 shares of $6 cumulative are outstanding, or in the $4 cumulative preferred stock of which 757,442 shares are outstanding, except that both classes of stock which now have no voting rights are to be made fully voting.

•

Commission Rejects Capital Change Plea

New York Public Service Commission has denied a petition of the New York State Electric & Gas Corporation, a subsidiary of the Associated Gas & Electric Corporation, for authorization of a revision of its capital. The commission held that the change would leave a large number of stockholders without voting rights.

The corporation sought to convert its no-par shares into par value shares, to reclassify shares and to issue 100,000 shares of $25-par preferred stock and 60,078 shares of $100 preferred stock to replace 85,078 shares of $100-par preferred stock previously authorized by the commission. The commission held that withholding of voting rights appeared "inexcusable and against public policy."

In another proceeding the commission authorized the corporation to procure authentication and delivery of $9,364,500 first mortgage bonds to provide for refunding of certain outstanding underlying mortgage bonds. The bonds are to bear interest at a rate not exceeding 4 per cent annually and to mature not earlier than 1965.

Earnings Reports (Utilities)

	Net Income 1937	1936
* Detroit Edison and subs.	$10,883,134	$11,047,469
† Nat. Pwr. & Lt. and subs.	8,025,800	6,538,613
† Pacific G. & E. and subs.	26,093,658	22,938,850
* Public Serv. of N. J. and subs.	25,505,543	23,174,109
† N. Y. State E. & G. Corp.	1,684,745	1,512,630
† Associated Electric and subs.	1,677,930	664,152
* Washington Water Pwr. and subs.	2,106,800	2,092,792
* Texas Electric Service	1,075,182	824,625
† Columbia G. & E. and subs.	12,679,293	12,945,118
† Pennsylvania Elec. and subs.	1,792,452	1,143,123
† American G. & E. and subs.	12,883,501	11,101,617
† Cincinnati G. & E.	3,924,652	3,966,120

† Twelve months ended June 30.
* Twelve months ended July 31.

Announcing

AN IMPROVED CONSTANT-CURRENT TRANSFORMER

WITH STRAIGHT-LINE REGULATION

STRAIGHT-LINE REGULATION

Tests show current variation so small from full load to short circuit that special meters were required to measure the deviation. This accurate control of current results in longer lamp life and a maximum amount of light per dollar.

CLAMP-TERMINAL BUSHINGS

Soldering the terminals to the secondary leads of the transformer is eliminated and positive contact is assured. Time is saved because it is easy to connect and disconnect the transformer in the event of replacement or test. These bushings are the same size as those used on standard distribution transformers.

AVAILABLE WITH CAPACITORS

The Type ROC transformer is also available with the new terminals and improved regulation. The capacitors in the tank will give a power-factor of 99 per cent—increasing the capacity of, and reducing the loss on, distribution lines. The prices of the Type ROC have been adjusted, making it competitive with the Type RO with separate capacitors. Mounting problems are simplified and maintenance is reduced with the capacitors in the transformer tank.

MODERNIZE NOW

This flexible transformer will fit into your modernization program and meet practically every condition experienced on distribution systems. Mail the attached coupon now for additional information. General Electric, Schenectady, N. Y.

Type RO

GENERAL ELECTRIC

Please send me one copy of GEA-2672, the new publication describing the new transformers and control.

Name.....

Position.....

City.....

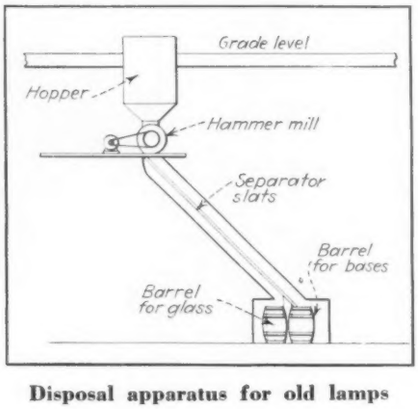
State..... 500-235

Field OPERATING PRACTICES

New ideas and practices in the operation of well-designed, constructed and maintained plants and systems

Metal Salvage From Old Lamps

Disposal of burned-out lamps, turned in for new ones by the citizens of St. Louis, is a very simple matter. Below a considerable part of the warehouse yard of the Union Electric Company are subterranean regions that were once the lower levels of a former power plant and in one of the larger of these caverns is the lamp-disposal apparatus.



Disposal apparatus for old lamps

As may be seen in the accompanying sketch, there is a hopper at ground level into which the old lamps are dumped from the truck that brought them from the lamp exchange offices. Below the hopper is a small motor-driven hammer mill such as is used by farmers for feed grinding. Broken up by the mill, the glass and metal bases of the lamps flow down an inclosed trough which has a false floor of parallel slats. The slats are spaced to allow the broken glass to fall through, but not the brass bases. At the bottom of the trough is a large inclosed box in which are set two barrels.

One of the barrels catches the glass flowing down on the bottom of the trough and the other the bases that roll down on the slats. The whole installation, hopper, mill, trough and box at the bottom, is completely inclosed so that no flying bits of glass nor glass dust can escape into the air.

•

Regulated Bus Best For Network Feeders

By

H. A. HOFFMAN and CARL SUTTER

Kansas Gas & Electric Company, Wichita, Kan.*

From experience with regulation of individual feeders supplying the secondary network in the downtown district of Wichita certain deficiencies in this manner of regulation became apparent. The network is served by six 4,000-volt feeders, each with a capacity of 1,400 kva. and each with three single-phase regulators, the line drop compensators of the six feeders interconnected for stable regulator operation.

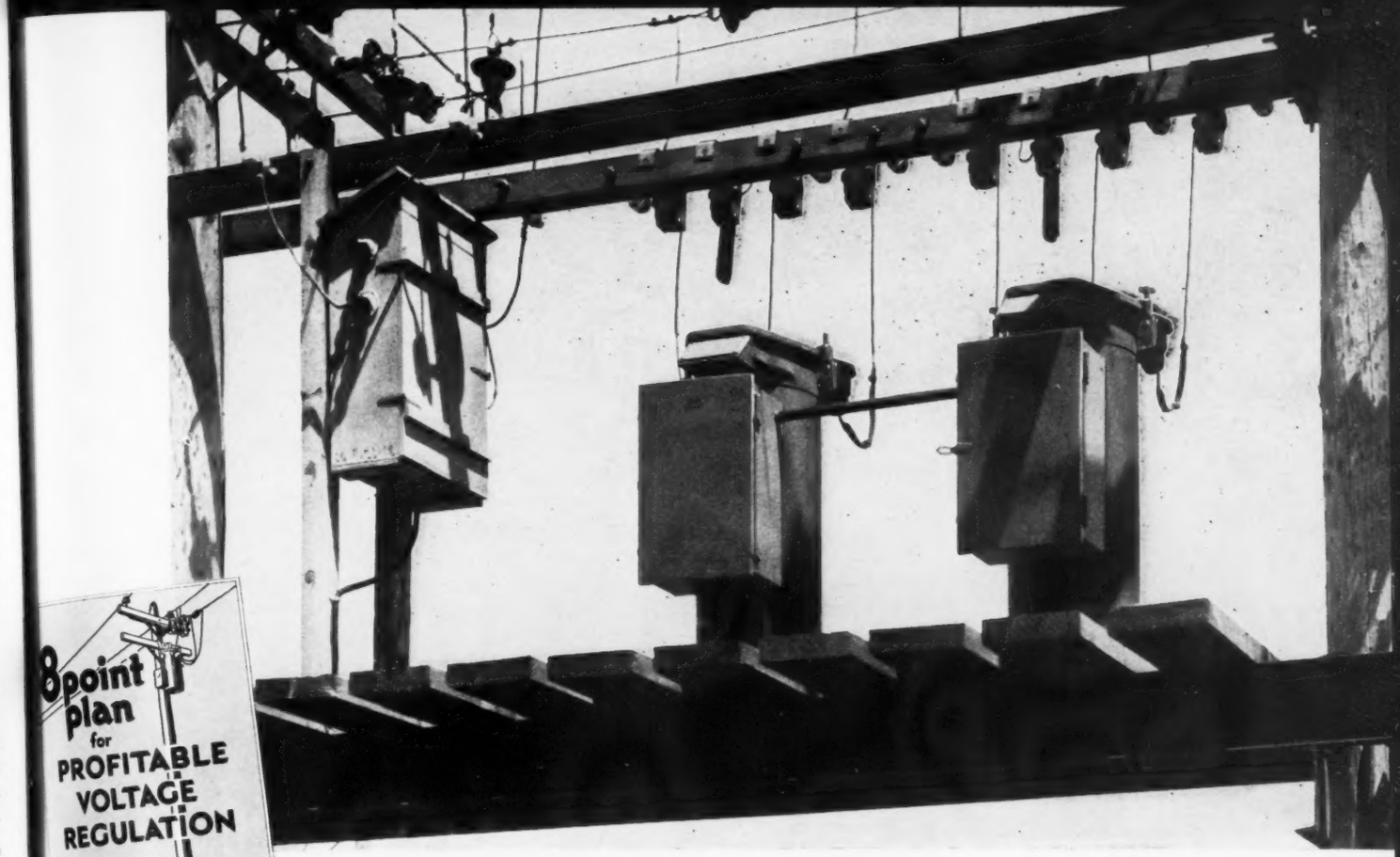
In the study of the regulation problem on this network, several tests were made to ascertain how the network would operate when supplied from a bus. This was accomplished by setting the regulators at a fixed boost and removing the automatic control. This arrangement gave very good results, all feeders taking practically the same load with balanced voltages on each feeder. At the time this method was tried suitable voltage could be maintained by setting the regulators at sufficient boost to take care of the heavy load periods and taking two feeders out of service at night so as to avoid excessive voltage during the light load. Later on the load on the system increased to the point where one setting of the regulators would not be sufficient to care for a complete load cycle. That is, when the regulators were boosted enough to take care of the heavy load period, excessive voltages would obtain during the light load. It was evident from these tests that a regulated bus would solve the problem and give better results than regulating separately the individual feeders.

There is always an unbalanced voltage condition with individually regulated feeders due to the fact that some feeders supply heavier load areas than others. The voltages on the heavier loaded feeders will be boosted higher than on the lighter loaded feeders so that at points on the system where vaults are close together there will be a tendency to set up circulating current between the two feeders. The interconnection between feeder regulators will tend to overcome this, but it cannot completely stabilize operation so as to be equivalent to a regulated bus.

Where the same voltage is supplied to the feeders as would be the case with a regulated bus, a more equal division of current will be obtained, for as the voltage is reduced on one feeder at the vaults due to the voltage drop on the feeder, the load will be picked up by other feeders, thus taking advantage of the network cable to reduce the current on the individual feeders.

* Abstracted from paper to Missouri Valley Electric Association.

Better Service to Customers at a $2000 SAVING!



A MIDWESTERN utility investigated the various ways for bringing electric power for the first time to a small village. The power load was to include a large feed-mill motor, which necessitated planning for severe voltage fluctuations.

It was found that the choice of the most satisfactory system rested between:

1. A 13,800-volt line
2. A 6900-volt line, equipped with two branch-feeder induction regulators, installed on the low-voltage side of two transformers rated 6900/2400 volts.

When the distribution engineers discovered that the 6900-volt line with two regulators not only cost $2000 less to install, but also offered 5% better voltage regulation, naturally they purchased regulators.

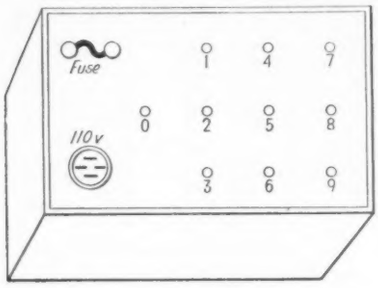
General Electric's complete line of voltage-regulating equipment is making such stories of savings, common on all distribution arrangements. This regulating equipment and its uses are fully discussed in a portfolio entitled "The 8-point Plan for Profitable Voltage Regulation." A copy will be sent you at your request. General Electric Company, Schenectady, N. Y.

GENERAL ELECTRIC

350-136

Test Device Speeds Ground Fault Location

When a ground puts a transformer or other station apparatus out of commission the trouble man frequently has to spend a lot of time finding the place where the insulation has broken down. If the fault turns out to be one that can be patched up by a temporary repair probably the greater part of the outage time will have been used in hunting for the fault and the lesser part in fixing it. For this kind



Rewound potential transformer provides test energy for locating grounds on station equipment

of fault hunting a source of test energy whose voltage is of the order of the rating of the damaged apparatus is very desirable. However, it is rather impracticable to take this test voltage from an available bus on account of the difficulty of handling it safely. A handy gadget for supplying this test energy is used by station trouble shooters of the Northern States Power Company, Minneapolis.

The device is an old potential transformer, rewound with taps brought out on the high side and fitted into a carrying box as shown in the accompanying sketch. The low (primary) circuit, with an open plain wire fuse in series, terminates in a receptacle in the cover panel. One leg of the high side is connected to the zero jack in the panel and nine taps up to the full secondary are connected to the jacks in the numbered order, the lower voltage taps closer to the zero jack. The two test leads are plugged into the jacks according to voltage desired. In this particular case the potential across the full secondary—that is, between the zero jack and No. 9—is about 5,100 volts and the intervening steps are about 350 volts each.

The fuse used in the primary is of low capacity so that the energy output of the secondary is limited to a very small amount, not sufficient to do any destructive burning, but still large enough to show up the place of fault in most cases. Of course the device is handled by the men using it with proper care for their personal safety.

•

Pipe Pushing for Street-Light Cable

By J. B. PRINCE
Sioux City Gas & Electric Company, Sioux City, Iowa*

In a recent installation of "White Way" street lighting in Sioux City pipe pushing was extensively used for carrying cable under sidewalks, driveways, street crossings and other paved surfaces. Complete record of all pushes and of the labor and time they required were kept and are here presented. Fifty-one pushes were made for a total of 2,025 ft. The shortest push was 15 ft. and the longest was 66 ft. The average length for all pushes was about 40 ft. Man-hours for excavating, pipe push, pipe pull-out and backfill and tamp averaged, respectively, 2.72, 6.2, 2.02 and 2.48.

All pushes were satisfactorily made with the exception of three. Two failures were due to solid obstructions of some kind. In both cases the pipe was removed and started again about one foot lower. No further trouble was encountered.

Practically all pushes were made at a depth of 20 to 30 in. below ground level, at driveways 20 to 25 in. and at street crossings about 30 in. Railway and street car tracks were given 36 in. clearance and no trouble was encountered with these except that the pushing was much harder, due probably to the fact that the ground was packed more solidly.

All pushes were made with 2-in. pipe with a coupling and pipe plug on the head. This gave us a hole through the earth nearly 3 in. in diameter and plenty of room for four cables if necessary. Two-inch pipe is stiff, has practically no side spring and has enough bearing surface on the side to withstand pushing aside small obstructions and still hold its course.

The pipe plug used on the head end was drilled to accommodate a wire for fastening the cable grip for pulling the cable back through the hole when the pipe was pulled out.

Two pipe pushers were used at times to very good advantage. In some places the driveways would run five and six to a block, thus eliminating much trench digging. By using two pushers we kept a fair balance between pushing and trenching. One pusher was a Simplex (from 2 to 4 in.), the other was merely a trip-free Simplex jack mounted on a 2 x 12-in. timber about 6 ft. long and equipped with fittings to accommodate a 2-in. pipe. Both were equally accurate and successful, the former somewhat simpler to operate. Pushes between 60 and 65 ft. long were made with perfect results and only a 24-in. parking to shoot at.

Old building foundations and sometimes chunks of cement have been found as obstructions.

On long pushes up to 90 ft., especially if the pushing has been hard, it is economy to make a small excavation midway between starting and fin-

* From paper to Missouri Valley Electric Association.

Cost per Square Foot for Trench in Sidewalk

Labor and Material

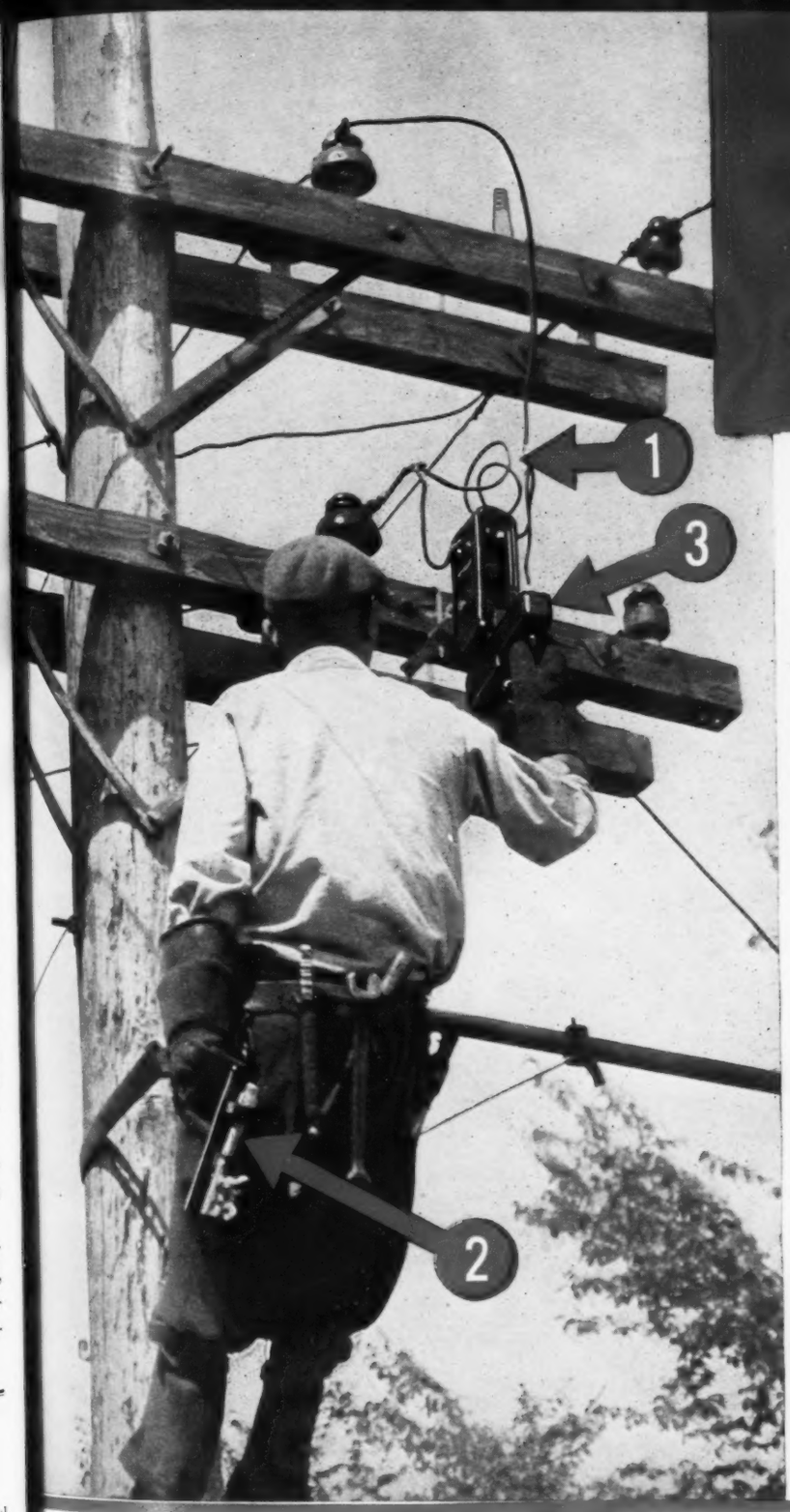
Removing Paving	Excavating for Cable	Backfilling	Replacing Paving	Total
$0.103	$0.041	$0.042	$0.169	$0.355

Cost of Pipe Pushing in Sidewalk

No.	Average Length of Push, Ft.	24 Sq.Ft. Removing Sidewalk	Excavate for Push	Push Pipe	Pull-Out Pipe	Backfilling	24 Sq.Ft. Replacing Pavement	Total	Unit Cost per Foot
5	62	$2.47	$1.40	$4.20	$1.80	$1.01	$4.06	$14.94	$0.24
7	51	2.47	1.40	4.00	1.30	1.25	4.06	14.48	0.284
14	43	2.47	1.35	2.80	1.80	1.30	4.06	12.78	0.298
11	34	2.47	1.20	2.50	0.76	1.20	4.06	12.19	0.360

Cost of Pulling Pipe Out

With truck—1.32 man-hours plus truck at .50=$1.16
By machine—3.14 man-hours = 1.57



ON WITH THE NEW

OFF with the old door and on with the new reclosing door—it's easy to convert your G-E 50-ampere enclosed indicating fuse cutouts to reclosers without interrupting service. Just:

1. **Shunt the cutout with a jumper**
2. **Unhook the old door**
3. **And put on the new reclosing door**

Then remove the jumper, and the cutout is ready to restore service. Should a fault occur, a second fuse link is automatically connected in the circuit one second after the first fuse link blows.

HOW YOU SAVE

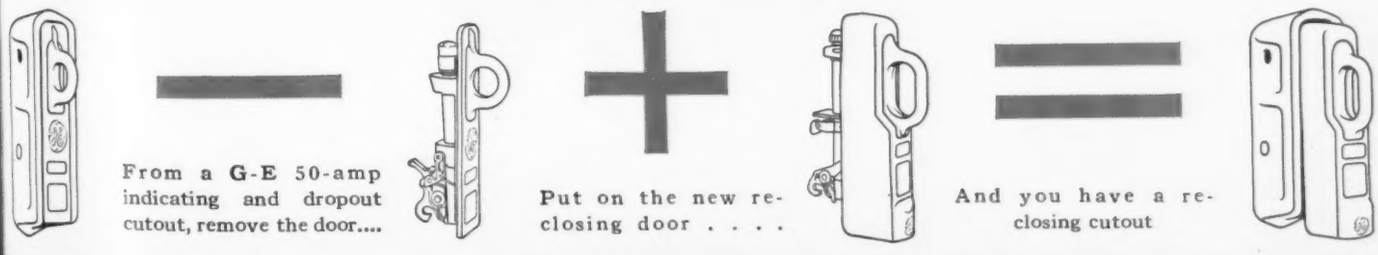
You can save money by converting your present G-E cutouts where you desire the reclosing feature. Or, if you wish, you can obtain a complete new cutout with the same reclosing door—50-ampere ratings at 5000 volts and 7500/12,500 gr-Y volts. In either case the cutout pays for itself the first time it recloses a circuit, because:

(a) You save the cost of one special trip by the service truck, and

(b) You gain the revenue that would otherwise be lost during the service outage.

Ask for Bulletin GEA-2707. General Electric, Schenectady, N. Y.

THE DOOR DOES IT



From a G-E 50-amp indicating and dropout cutout, remove the door....

Put on the new reclosing door . . . .

And you have a reclosing cutout

340-33

GENERAL ELECTRIC

ishing points to determine the course of the pipe. If the pipe has changed its course it can be brought back into position by exerting pressure on whatever side is necessary during the remainder of the push to make it successful.

From our experience on this job we have come to the following conclusion regarding pipe pushing:

It is economical to push a pipe across any paved street rather than to trench and replace paving.

It is economical to push a pipe under concrete sidewalks where the distance is over 25 ft.

•

Hints on Application of Line Capacitors

By H. C. EISLER
District Superintendent
Kansas Electric Power Company,
Emporia, Kan.*

On loads of a rapidly fluctuating nature, resulting in flicker and poor regulation, series capacitors find application because of their instant correction of voltage with change of load. Capacitor reactance may be chosen the same as the line reactance, in which case the resulting regulation will be only that due to conductor resistance. However, the use of a series capacitor is generally limited to fluctuating loads, since its rating is determined by the circuit constants and the load on the line. This makes it difficult to shift the capacitor to other lines when the system is changed or the load increases beyond the capacitor rating.

Shunt type capacitors not only improve regulation but, by decreasing the line current, reduce the line losses, the load on the feeder equipment, substation transformers, transmission lines and the generating station. Application of the shunt capacitor is generally limited to the larger conductors, as the part of the regulation due to the circuit reactance on the smaller sizes of conductors is small. The voltage correction obtained from a shunt capacitor is governed by the reactance of the feeder, hence this application is more effective for the larger conductors and long circuits.

To obtain the maximum benefit from the shunt capacitor it should be located near the end of the line and the size limited by the voltage rise at this point at the time of minimum load on the circuit. The use of capacitors on regulated circuits at the end of lines where low voltage exists will materially improve the regulation and also decrease the load on the feeder equipment. Shunt capacitors which are removed from service due to changes in primary circuits can readily be shifted to new locations as they are of standard sizes and the unit need not be closely co-ordinated to the line constants.

* From paper to Missouri Valley Electric Association.

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Manhole Drains

All manholes should be properly drained. If a sewer connection is not available, some other drain should be provided. The following practice of the Detroit Edison Company may serve as a guide for various ways of providing drains:

Drains—If a public sewer of sufficient depth is located in the same street or alley with a conduit line, manholes shall be drained to this sewer. All manholes within 500 ft. of a Detroit Edison substation (except suburban, where individual cases shall be considered) shall be drained. Where a separate connection from each manhole to a sewer is impracticable, an indirect connection may be made by running a drain from such a manhole underneath the conduit to a manhole which has a direct connection, provided such indirect drain will not be over 125 ft. long.

All drains shall have a slope of not less than 0.4 ft. per 100 ft. toward their sewer outlet.

The drain shall be constructed of vitrified clay sewer tile with bell and spigot joints. All joints shall be packed with oakum.

Drains from one manhole only to sewer or from one manhole only to another manhole shall be of not smaller than 4-in. tile.

Drains provided for carrying the drainage of more than two manholes such as a connection to the sewer, from a manhole into which two or more other manholes drain by indirect connection, shall be of not smaller than 6-in. tile.

Where a drain is laid under a conduit there shall be not less than 1 ft. of well-tamped earth between the top of the tile and the bottom of the concrete envelope.

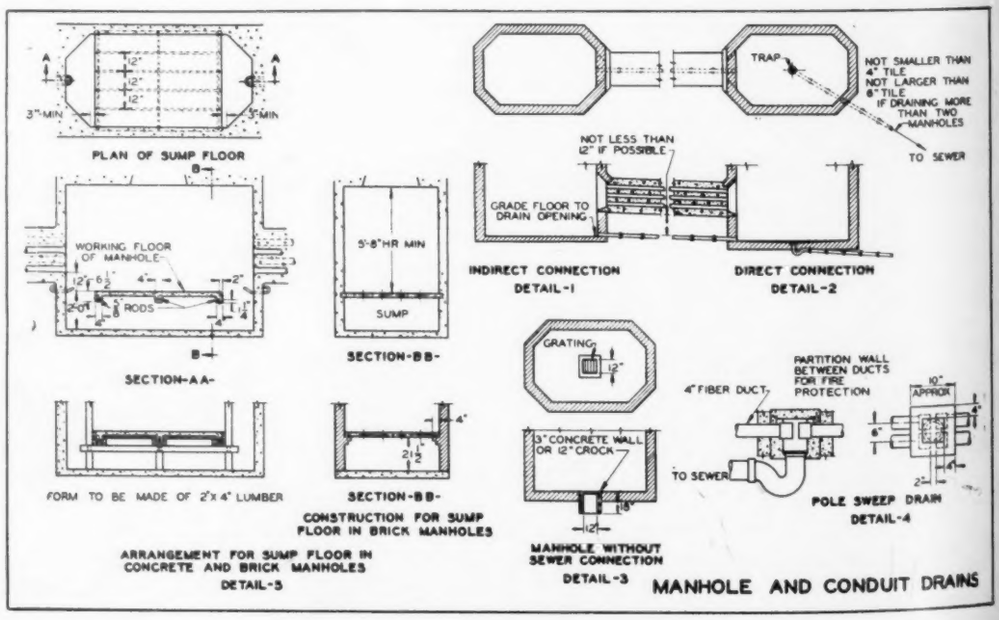
Where the connection is direct from manhole to sewer it shall be provided with a trap which shall be readily accessible from the inside of the manhole without breaking into the walls. The trap for the floor outlet shall be a P trap or running trap. The trap should not be located directly under the manhole cover.

Pole Sweep Drain—Where conduit runs directly from the cable pole to a primary customer's service vault with no intervening manholes, a drain, with trap, to a sewer, if one is available, shall be installed. In this case both sweep and conduit should grade toward the drain outlet.

Manhole Without Sewer Connections—Manholes without direct or indirect drains to a sewer shall be provided with a sump of the same area as the manhole floor and of at least 50 cu.ft. capacity. In the case of an undrained brick manhole particular care must be taken to have joints filled with mortar and the outside of roof and walls thoroughly plastered with cement mortar.

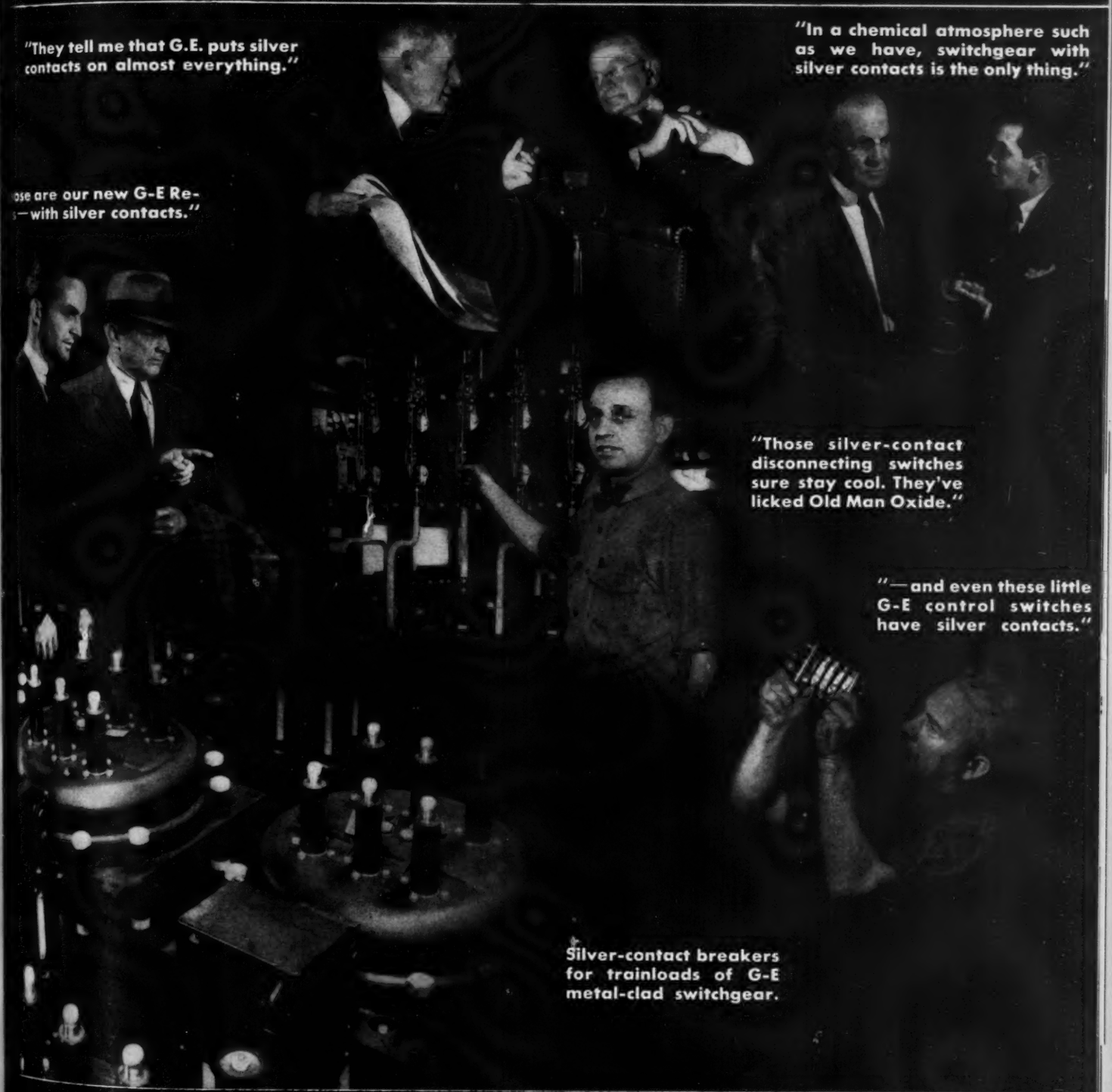
Where specially ordered, manholes may be built in sandy soil or gravel with good natural drainage without tile connections to a sewer.

In such cases a sump shall be built in the floor of the manhole. This shall be not less than 12x12 in. and 18 in. deep with 3-in. concrete walls, but no concrete floor, or 12-in. crock 2 ft. deep, and shall be covered with an iron grating flush with the manhole floor.



Why this Trend to SILVER CONTACTS?

To reduce switchgear maintenance by the elimination of oxidation troubles


"They tell me that G.E. puts silver contacts on almost everything."
"In a chemical atmosphere such as we have, switchgear with silver contacts is the only thing."
ose are our new G-E Re- —with silver contacts."
"Those silver-contact disconnecting switches sure stay cool. They've licked Old Man Oxide."
"—and even these little G-E control switches have silver contacts."
Silver-contact breakers for trainloads of G-E metal-clad switchgear.

890-15

GENERAL ELECTRIC

Industrial ELECTRIFICATION

New ideas and practices in industrial electrification as presented by industrial, consulting and power sales engineers

Modern Furnaces Cut Alloy Melting Costs

By W. A. GATWARD
Chief Engineer Hoskins Manufacturing Company, Detroit, Mich.

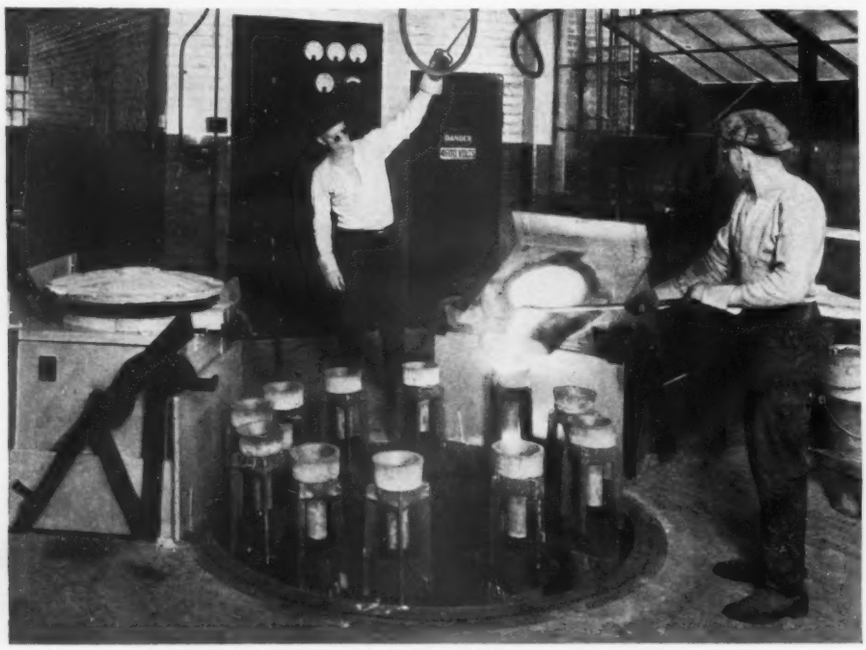
Improvement in plant power factor, increased operating efficiency, greater flexibility and higher melting speeds are among the advantages accruing to the Hoskins Manufacturing Company from the installation in its Detroit plant of several 960-cycle Ajax induction furnaces for melting "Chromel" metal and other alloys. These furnaces displaced old 60-cycle, ring-type induction furnaces which operated at a power factor in the vicinity of 50 per cent.

It was formerly necessary, with the old 60-cycle ring-type furnace, to leave about 20 per cent of the charge in the furnace during all shutdown periods. If the metal froze it had to be chipped out, a new lining installed and a new starting ring put into the furnace. The danger that the lining would fail during an important time in the production schedule was always present. With the high-frequency furnace each heat can be "poured clean." This is an important consideration when a large number of alloys are being made. Stirring action being under control in the newer furnaces allows full advantage to be taken of deoxidizers and results in a very uniform product.

The first high-frequency furnaces installed in this plant, in 1928, were powered from a 150-kw., 900-volt, 960-cycle motor-generator set. These furnaces ordinarily melt 500 lb. of metal, but can handle 700 lb. if necessary, and operate on 55-minute cycles. The average lining life is around 200 melts, with some linings lasting 600 heats. A second pair of 750-lb. furnaces was added in 1930, supplied from a 300-kw. generator at 960 cycles, 800 volts. These furnaces also operate on a 55-minute cycle.

Recently installed are a pair of 1,600-lb. furnaces which can handle 1,800 lb. charges if necessary. These furnaces operate from the second motor-generator set, drawing 340 kw. maximum. The melting cycle is 1½ hours, pouring 1,600-lb. heats. The turntable equipment shown in the illustration is not so satisfactory on these larger furnaces because of the large amount of heat liberated from the metal contained in such a small turntable. It has been necessary to install air cooling equipment for the comfort of the operators.

These high-frequency furnaces permitted installation of a synchronous motor for plant power-factor correction. Over-all plant power factor has been increased from 65 per cent in 1928 to 95 per cent in 1937. During regular operation the furnaces last installed use 640 kw.-hr. per ton of metal poured. The improvement in plant power factor has been sufficient to make the saving in power bills very considerable.



High-frequency induction furnaces, rated at 300 kw. each, melt 750 lb. of metal in 55 minutes

In normal operation each furnace is used for heat after heat. When a change is made from one alloy to another the furnace is used which is in the best condition for the type of alloy to be melted. The casting wheel scheme is used to conserve space.

•

4-Speed Drive Needs Little Machine Space

In the machine shop of the Hygrade Sylvania Corporation at Salem, Mass., flexibility, compactness and safe operation of an individual drill press drive have been achieved by mounting the motor, a constant-speed induction unit, on a base attached to the frame, carrying the drive vertically to the top of the tool and thence across and downward to the working area as shown. Vertical mounting of the motor permits direct shaft connection to

OLD *RED-HOT*

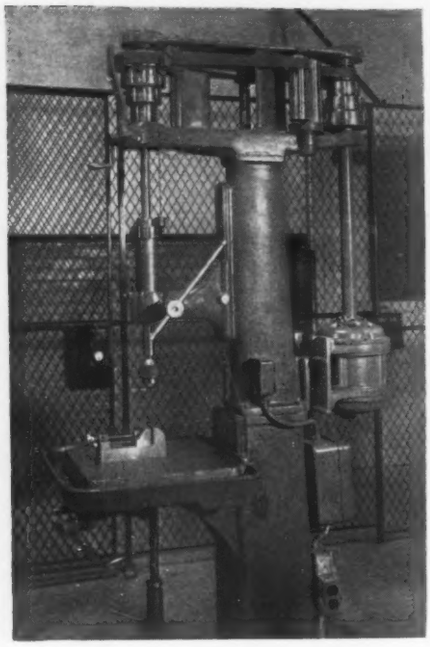
Whether he goes into action as a rip-roaring bonfire or an invisible 200° F. *(or higher)* ambient, this symbolic sizzler is up to no good. His pet hobby is to burn or heat-rot wire insulation just for the fun of seeing you replace the wire when it fails . . . and then he goes back and does it all over again *if you let him.*

You can beat the old boy at his own game by giving him wire to work on that he can blast until he's red in the face *without injury to the insulation* . . . Rockbestos! It stops him cold because it's made of specially processed asbestos, and if you've ever used any you know that heat and fire don't bother it at all.

Rockbestos wires, cables and cords are made in more than fifty different standard constructions for heat-exposed installations. Our research laboratory can take care of special requirements. And, if you don't know what Rockbestos is, send for samples and a No. 10-D catalog. Rockbestos Products Corporation, 862 Nicoll Street, New Haven, Connecticut.

Also refer to Electrical World Buyer's Reference Number of Dec. 19, 1936. Part II.

ROCKBESTOS A.V.C.—*the wire with permanent insulation*



Combination shaft and belt drive provide flexible tool service

the first set of pulleys above, and a single belt run between the four pulleys provided at each shaft end with intermediate idlers to take up slack gives a short, positive drive with provision for rapid changes in speed by the belt-shifting handle. A belt guard at the top of the frame furnishes desirable protection against accidental contacts, and the wiring, push-button control and starting switch are metal clad and accessible for operation and maintenance.

•

Recording Meters a Check on Production

Many other items than purely electrical information are obtained from the use of graphic meters in a steel plant. An enumeration of them was given by H. G. Weaver in a recent article in the (British) *Electrical Review*. All of them were evidenced on one five-hour chart of kilowatt input to a continuous rolling mill motor engaged in rolling billets down to hoops:

1. Several long delays, in one case amounting to eleven minutes.
2. An increase in the motor load from 600 to 1,000 kw. in one case indicated a considerable reduction in the temperature of the steel due to improper operation of the heating furnace.
3. A slowing down of the rate of feeding billet to the mill, evidently to help the furnace retain its proper temperature.
4. That the front end of the billets had a lower temperature than the remainder.
5. That the mill stopped in one case for sixteen minutes.
6. The drop in power to roll the first few billets after the delay indicated an increase in furnace temperature.
7. Another delay of eighteen minutes.
8. The power taken to run the mill empty served as a check on bearing conditions and similar important features.
9. That the output could be increased by 10 per cent by merely increasing the speed of feeding.

This is of great importance not only to steel mills but to other industries. The number of things that can be checked from the records of the graphic wattmeters does not seem to be sufficiently appreciated in this country.

•

Wire Mill Adopts Electro-Galvanizing

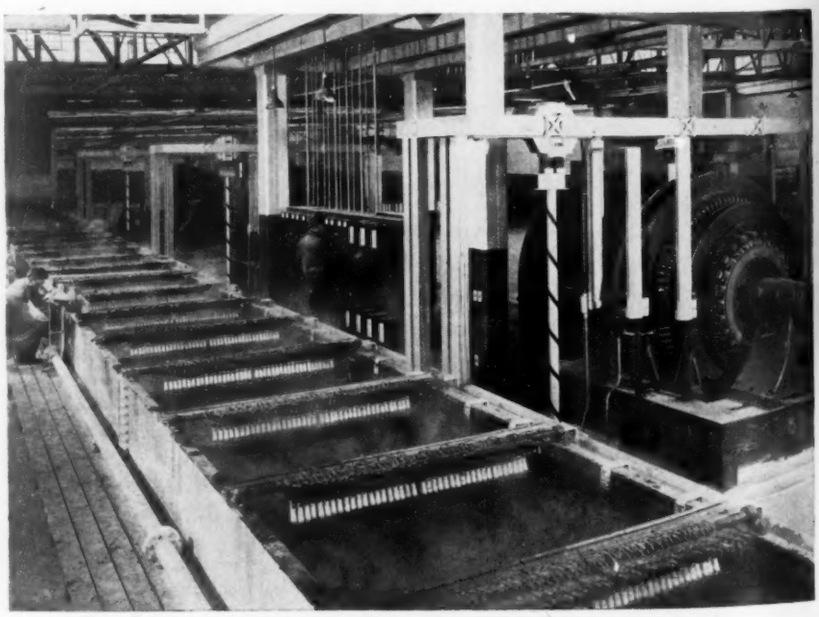
Recent achievements in electro chemistry, metallurgy and industrial engineering have been combined in the unit for the continuous electro-galvanizing of wire recently installed in the new wire mill of the Republic Steel Company, South Chicago, Ill. This unit, which is more than 500 ft. long, is capable of galvanizing 578 miles of wire a day with 40 wires galvanized simultaneously.

Six motor-generators supply d.c. to the electro-galvanizing department. Plating current is supplied from four 20,000-amp., 7-volt motor-generator sets driven by 220-hp., 2,300-volt, three-phase synchronous motors. Two small sets with 20-hp. driving motors supply current to the flash cleaner.

After normalizing in a pot of molten lead as in hot galvanizing, the wire to be galvanied cools and passes over sheaves into cleaning tanks which extend for a distance of 70 ft. Wire then passes through a hot alkaline bath that removes all surplus dirt, then through a water rinse and into a pickle tank, where remaining surface impurities are attacked by acid. After another rinse, minute particles still present in the pores and structure of the steel and which might prevent a perfect bond are eliminated by passing the wire through an electrolytic flash cleaner. After still another rinse and a final acid dip it passes through a final rinse into the electro-galvanizing tank. Large rollers hold the strands beneath the surface of the successive solution and they are kept in line by porcelain sleeves on dividing walls between the various tanks.

The electro-galvanizing tank is 140 ft. long, 6 ft. wide and 2 ft. deep. Approximately 43,000 gal. of special galvanizing solution in the tank circulates in a direction opposite to that of wire travel, passing through filters, three 10,000-gal. settling tanks and a cooling tower. Thirty tons of zinc anodes are immersed in this solution in the bottom of the electro-galvanizing tank. The wires, which function as cathodes, pass through the solution a little below the surface at speeds ranging from 35 to 70 ft. per minute, depending upon the coating to be applied. The character of the special electro-galvanizing bath makes it possible to deposit 27 successive, even coatings of zinc 99.9 per cent pure upon the copper-bearing steel wire at current densities up to 1,500 amp. per square foot, without developing either pores or pits.

Wire passes out of the tank with its coating dense and bright. It is dipped into a cold rinse to remove adhering solution from the galvanizing tank, then into hot rinse to remove final traces and to heat the wire so that when it enters the air for winding on the take-up reels any remaining water will dry quickly.



Electro-galvanizing unit produces 578 miles of fence wire per day

One of four 20,000-amp. motor-generator sets is seen in the right background. Operations are controlled at the central switchboard.

Wagner Air-Cooled Transformers

Where to Use Wagner Air-Cooled Transformers

There are many places in your plant where Wagner air-cooled transformers can save you money and improve the efficiency of operation of your equipment. Wagner air-cooled transformers are approved by the National Board of Fire Underwriters, and can therefore be safely installed indoors.

Wagner air-cooled transformers can be easily installed anywhere; immediately adjacent to machinery requiring lower or higher voltages than supplied by the power or lighting circuit; inside factories, offices, stores and homes. Special mountings are not required. The table below lists the major applications and advantages of installing Wagner air-cooled type AC general purpose and type AA auto-transformers.

APPLICATION	ADVANTAGES
Stepping-down higher power circuit voltages to lower-circuit voltages for Drills, Electrical appliances, Exhaust fans, Floor scrubbers, Glue pots, Lamps, Oil well machinery, Portable tools, Projectors, Pumps, Riveters, Saws, Small compressors, Soldering irons, Vacuum cleaners and other low-voltage machinery	All industrial electrical equipment placed on the power circuit means economy. By installing Wagner air-cooled (type AC or type AA) and stepping down the power circuit voltage, appliances and machinery that require lower voltages than that supplied by the plant's power circuit can be connected to the power circuit, instead of the lighting circuit.
To permit operating low-voltage equipment, such as: Low-voltage lighting circuits Signs Airport lighting 32-volt lamps	It is often desirable to use low-voltage lamps and signs, since they are often more economical, have longer life and are a better source of illumination. Wagner air-cooled transformers provide advantageous means for operating low-voltage equipment.
Stepping-up a lower lighting circuit voltage to a higher voltage for Small motors	Sometimes small motors are located where power current is not available. By using Wagner air-cooled transformers for obtaining a 230- or 460-volt power voltage from a 115-volt or 230-volt lighting circuit, higher-voltage motors can be utilized.
Boosting voltages to their proper value for Motors	To obtain the most satisfactory service from motors, they should be operated at the voltage for which they are designed. The efficiency and starting torque of motors may be increased by using air-cooled transformers for correcting any drop in voltage in plant wiring, or for stepping up any 199-volt net-work-voltage to 220-volts for motors.
For insulating circuits such as: Telephone circuits Lighting circuits Signal and control circuits	For safety and other reasons, Wagner type AC general purpose transformers can be profitably used for insulating telephone and signal circuits from lighting circuits; insulating lighting circuits from power circuits; insulating control circuits from either lighting or power circuits.
For phase changing from Three to two phase Two to three phase	When a utility company makes a phase change in its system (such as changing from two to three phase), the use of two-phase equipment is often rendered obsolete. By installing Wagner air-cooled transformers and transforming from three to two phase, two-phase machinery and equipment do not have to be replaced.

In your plant will probably be found many other economical uses for air-cooled type AC general purpose distribution and type AA auto-transformers, besides the applications listed in the above table.

Before purchasing and installing any auto-transformers, consult the local power company engineers or the nearest Wagner Branch, for power companies often have special regulations, and may require the use of special protective equipment which may make the cost of an air-cooled transformer installation prohibitive.

Wagner Air-Cooled Transformers are available in sizes up to 50 kva. and up to 600 volts.

TD 237—C

Why not investigate the advantages of installing Wagner air-cooled transformers? Write today for Form S527 which gives complete information about these transformers.

Wagner Electric Corporation

6400 Plymouth Avenue, Saint Louis, U.S.A.

Building Up THE LOAD

New ideas and practices in selling electrical equipment and service to commercial and domestic customers

Reports Farm E.A.R. of $54,670 for Year

The 1936 farm electrification program of the Pacific Power & Light Company was divided into three parts: (1) Line extensions to serve additional farm customers; (2) farm equipment sales; and (3) domestic appliance sales. Estimated annual revenue from all activity was $54,670.21.

During the year, 14 districts reported new line extensions to serve 648 additional farms, this number representing 154 per cent of the quota of 420 farms to be connected for service during the year. At the end of the year, 9,736 farm customers were being served, an increase of 785, or 8.7 per cent over the number served at the end of 1935. Estimated annual revenue from these new customers, from residential lighting, totaled $11,664.

All together, 1,449 units of farm equipment, aggregating 1,065.5 horsepower, were sold by the company as well as by dealers; estimated annual revenue from these sales was $22,939.21. This represents $2.47 per customer, compared with $2.51 in 1935. Material increases over 1935 were shown in the total number of installations of brooders, water systems, incubators, farm motors and farm yard lighting. Brooders especially showed an upward trend with 109 more reported this year than in 1935, establishing a new company record in brooder load addition. In all, 389 water systems were installed in 1936, exceeding the 1935 record by 36 systems.

Records of domestic appliance sales on farms, kept for the first time in 1936, indicate additional farm revenue from this source to the amount of $20,067. In that year 1,665 units were sold, including 432 washers, 419 refrigerators, 150 ranges and 108 water heaters.

Finally, rural representatives of the company made 11,887 farm visits during the year to do service work on 8,213 separate farms.

Cleaner Air for Chicago Building

Already air conditioned to the extent of temperature and humidity control, the lower arcade and first four floors of the 45-story Field Building, Chicago, will now have clean air with the installation of Westinghouse electrostatic air cleaners.

Including the offices, specialty shops and restaurants on these floors, the installation will provide practically complete air conditioning and healthful atmospheres. It is said the installation brings relief to sufferers of hay fever and reduces cleaning costs.

The air cleaning equipment, which consists of eighteen units, ranging in capacity from 33,000 to 3,000 cu.ft. per minute, employing a total of 369 collector cells and 185 ionizing assemblies, will have a capacity of 272,700 cu.ft. of air per minute and an efficiency of more than 99 per cent of weight of particles removed from the air. Operating on an electrostatic

FIRST AND TEN-THOUSANDTH—On the left is farm customer Number 1 on the lines of the Pacific Power & Light, together with Alva L. Day, rural service man who sold the job 31 years ago. On the right is farm customer Number 10,000 recently signed, also sold by Mr. Day

A PRACTICAL NON-TAMPERABLE FUSE

RESISTS TAMPERING AND OVER-FUSEING

WIPES OUT ANY EXCUSE FOR TAMPERING

A Fustat can't be replaced by a penny or slug — and it is practically impossible to bridge it with tinfoil, strands of lamp cord or any other material.

Stops use of over-size fuses — a 20 or 30 ampere Fustat will not fit in a 15 ampere receptacle or adapter. Similar limitations apply to all other sizes.

Once you have installed the correct size to protect, your protection cannot be taken from you.

But that's not enough . . .

A non-tamperable fuse that would blow on starting currents would be an impractical device — a terrible nuisance — so the Fustat . . .

because —

IT STOPS NEEDLESS BLOWING

A Fustat won't blow when washing machines, refrigerators or other motors start. A 15 ampere Fustat will permit you to load an ordinary circuit to capacity — and yet not blow on motor starting.

It gives you SAFE PROTECTION without USELESS SHUTDOWNS.

Adapter fits Edison base fuse holders and locks in place.
Retails at 7½c

Protects flexible cords against burnout — in spite of its long time-lag

The Fustat contains a fuse. The ability of a fuse to protect against dangerous cord shorts or grounded sockets is well known.

The Fustat – HOLDS like a LARGE FUSE when safety permits, yet, OPENS like a SMALL FUSE when safety demands

Today's circuits demand the Fustat — *for what other device can . . .*

1. Make safe protection remain safe.
2. Stop loss of money on needless "blown fuse" service calls.
3. Permit adding more appliances to present circuits.

The FUSTAT

RETAIL PRICE ONLY 7½c

Write for full information to any of the undersigned

BUSSMANN MFG. CO.
University at Jefferson
St. Louis, Mo.

KIRKMAN ENGINEERING CORP.
121 Sixth St.
New York, New York

NATIONAL ELEC. PRODUCTS CORP.
Fulton Bldg.,
Pittsburgh, Pa.

AIR CLEANERS, operating on an electrostatic principle, will complement the present installation in the Field Building, Chicago, to provide more healthful atmospheres for the offices, shops and restaurants on the lower arcade and first four floors

principle, the air cleaner will remove microscopic particles as small as one-fifth micron in size and will operate on the small consumption of 10 kw.

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Transcriptions Used to Improve Selling

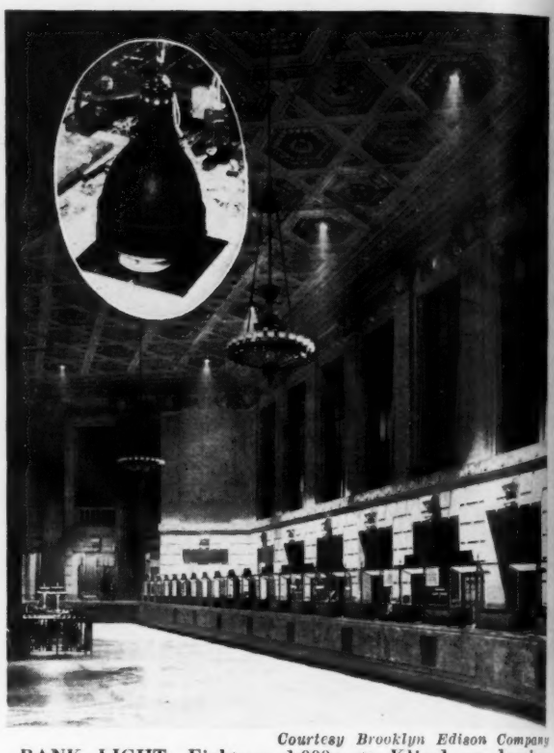
Interesting in sales training methods was a recent novelty introduced at the Twin Falls sales meeting of the Idaho Power Company by A. S. Gilbert, sales manager of the division. Some years ago R. E. Gale, now commercial manager of the company and then sales manager at Twin Falls, induced several salesmen to record their sales stories on phonographic transcriptions. The 1932 brand of sales talk was contrasted with the 1937 brand, the idea proving to be definitely beneficial from the standpoint of the salesmen. When a salesman's talk is re-played the defects are available for study and improvement. There is a constant incentive to improve both the diction and presentation when there is a reference comparison available.

Bank Lighting Aided by Projection Units

The fixtures used by the Dime Savings Bank, Brooklyn, satisfied the esthetic sense but completely neglected the functional illumination necessary for the tellers' cages, accounts files and clerks' desks. The former style of supplementary lighting was inadequate, spotty and glaring, desk lamps providing 1 to 15 foot-candles at desk level.

A need for some form of general lighting was indicated but the solution was complicated by the ceiling treatment, a clever system of polychrome rosettes forming a subtle series of equilateral triangles. Any obvious alteration of the rosettes would have seriously interfered with a beautifully-wrought architectural feature.

It was found that eighteen 1,000-watt Kliegl condensing lens projection units would require only a four-inch dia. hole in the ceiling and would not disturb the rosettes.



Courtesy Brooklyn Edison Company

BANK LIGHT—Eighteen 1,000-watt Kliegl condensing lens projection units (insert) provide lighting intensities at desk level behind cages of 9 to 15 foot-candles with the main fixtures turned off, and preserve architectural details of ceiling

The resulting effect is said to be entirely satisfactory from an economical as well as from an esthetic point of view.

PUGET SOUND SHOWS AND SELLS

Adopting the principle of selling by demonstration has resulted in "field days," such as that shown above, for water system salesmen in the Pacific Northwest. The utilities and manufacturers, co-operating in the electric water systems promotion, stage exhibits such as this for local prospects. Allowing the farmer to see exactly what an electric water system will do has proved to be a potent method of building sales. The group shown here is operating near Puyallup, Wash., in the territory of the Puget Sound Power & Light Company.

PURCHASING AGENT:
"I UNDERSTAND OVER 200 POWER COMPANIES ARE USING HEMINGRAY GLASS INSULATORS ON THEIR DISTRIBUTION AND RURAL LINE CONSTRUCTION THIS YEAR."
DISTRIBUTION ENGINEER:
"I WOULDN'T BE SURPRISED. OUR OWN TESTS ON HEMINGRAY HAVE BEEN MORE THAN SATISFACTORY. I AM SPECIFYING THEM FROM NOW ON FOR ALL NEW CONSTRUCTION."

To gain nation-wide approval ng utility engineers and pur- ing agents, a product must ess sound values. It must ren- efficient service at reasonable and be available in quantities led at short notice.

MINGRAY Brass-Bushed Glass lators for distribution and l power lines fulfill the re- ements of the most exacting lator buyer. Their perform- in service backs up the judg- of the man who buys them.

If you haven't tried HEMINGRAYS—order some today from your jobber or write OWENS-ILLINOIS GLASS COMPANY, Hemingray Division, Muncie, Indiana.

- Brass-bushed for greater strength, perfect threads and full protection against pin expansion.
- Hemingray provides many advantages: greater mechanical strength . . . sustained dielectric strength . . . unaffected by sudden temperature changes . . . withstands maximum insulator pin expansion . . . never ages or deteriorates . . . controlled uniformity of product . . . all surfaces impervious to moisture . . . tougher —withstands rough handling . . . clear, flawless for easy inspection.

●

R MODERN POWER LINE INSULATION

Order HEMINGRAY Glass INSULATORS

New ENGINEERING IDEAS

Discoveries, proposals and developments by electrical engineers and scientists in the field, the factory and the laboratory

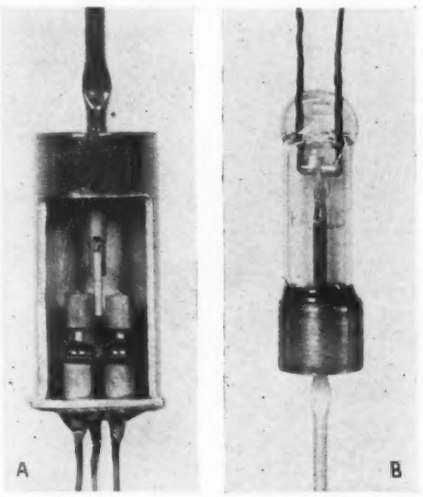
Arcing Time Reduced in Vacuum Switches

By A. J. KLING
Vacuum Tube Engineering Department, General Electric Company, Schenectady, N. Y.

Burning, welding and high contact resistance resulting from arcing at contacts have been substantially reduced in two recently developed vacuum switches. Since the contacts are inclosed in an evacuated chamber and thoroughly outgassed there is no gaseous arc. Metal vapor, freed at the cathode spot, is rapidly dispersed, thus cooling and extinguishing the discharge before a stable arc can form. Relatively large currents may be interrupted without appreciable arc, only a slight cathodal spark at the last point of contact being observed.

Rating and Characteristics

	All-Metal	Metal-Glass
Maximum d.c. voltage	500	3,000
Maximum a.c. voltage	440	3,000
Continuous current (amp.)	10	8
Interrupting ratings (amp.) (non-inductive)		
at 250 volts a.c. and 125 volts d.c.	10	8
at 250 volts a.c. and 250 volts d.c.	7	6
at 250 volts a.c. and 500 volts d.c.	4	4
at 440 volts a.c.	7	
at 600 volts a.c.		6
at 1,500 volts a.c. or d.c.		0.5
Characteristics		
Force required to move operating contact from one stationary contact to the other (at 2⅝ in. from diaphragm)		
Maximum (including initial tension), grams	100	75
Maximum (initial tension neutralized), grams	70	50
Average (initial tension neutralized), grams	40	30
Maximum safe contact pressure (at 2⅝ in. from diaphragm), grams	250	250
Travel of arm (at 2⅝ in. from diaphragm)		
Maximum, inches	0.045	0.026
Average, inches	0.045	0.026
Dimensions (inches)		
Maximum diameter	0.850	13/16
Approximate length (including leads)	5⅝	9



Vacuum-inclosed contacts reduce burning, welding and high contact resistance in single-pole, double-throw switches

(A) Part of the metal container of the all-metal switch has been cut away to expose the inner construction. A flexible metal diaphragm acts as a natural fulcrum point for transmitting motion of the operating arm of the switch to the contacts. No external fulcrum is needed. (B) Glass has been substituted in the metal-glass switch for part of the metal shell to permit operation at higher voltage.

Complete electrical and mechanical characteristics of these switches are listed in the accompanying table.

The new switches have several features not found combined in contacts operating in air. Low contact resistance, for instance, is obtainable with very light pressure, since contacts remain bright and clean in the absence of oxygen or other corrosive agents. Very small movement of the contacts is required for interruption, and the movement need not be rapid. Little heat is generated at the contacts since the arc duration is very short. High-speed operation is possible because of the light-weight moving parts and the rapid interruption. Long-life contacts result from elimination of corrosion and arcing. Hermetically inclosed contacts permit the switch to be mounted in wet or crowded places and to be adapted easily to oil- and water-immersed operation.

•

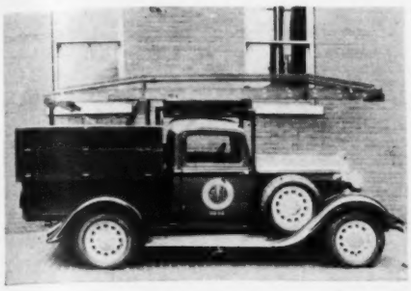
Cable Impregnated With Nitrogen Gas

Advantages claimed for the new British-made high-voltage cable using dry paper and nitrogen gas at 200 lb. per sq.in. pressure for insulation are:

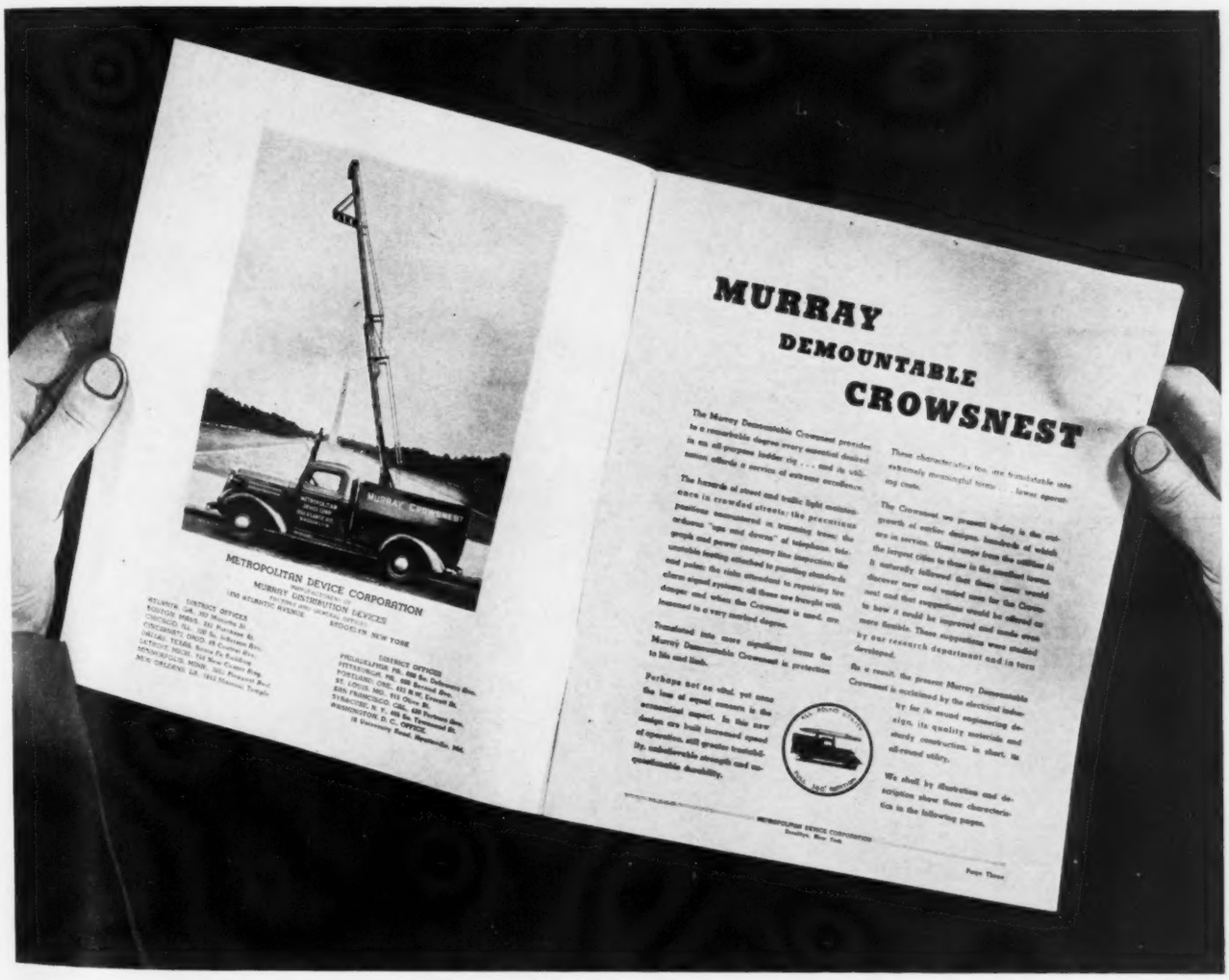
(a) Absolute stability under severe heat cycles.
(b) Low capacitance and losses in the dielectric.
(c) High running temperature.
(d) Complete freedom from gradient troubles.
(e) Simple pressure-regulating equipment.
(f) Cheapness of manufacture.

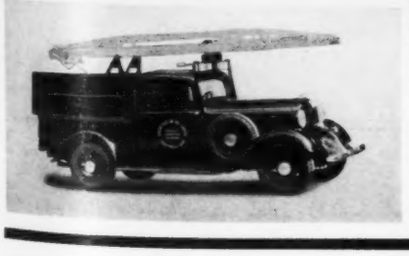
Because of the compressibility of the gas, heat cycles do not cause voids in the dielectric. The weight of the gas is small compared to that of oil or solid dielectrics, and the pressure at low points in the cable is not much more than that in the points of highest elevation.

The charging current of a gas-filled cable is 63 per cent of that of one insulated with oil. Its power losses are about half when the cables are cold, and do not increase with temperature as those of other types of



An All-Purpose Ladder-Rig That Assures Safe, Speedy, Low Cost Operation Is Described In A 20 Page Bulletin . . . The Coupon Will Bring You The Bulletin—Without Obligation





METROPOLITAN DEVICE CORP.
1250 Atlantic Avenue, Brooklyn, N. Y.

Please send without obligation, 20 page bulletin describing the MURRAY DEMOUNTABLE CROWSNEST.

Name ..... **Title** .....

Company ..... **Address** .....

insulation do, according to the recital in a recent issue of the *Electrician*.

Construction and manufacturing methods differ somewhat from standard practice. Smooth-surfaced cylindrical conductors are used to reduce the stress. They are obtained by means of a lead sheath extruded over the stranded copper. Dielectric paper is then wrapped on in the ordinary way and the outside covered with a conducting paper. A linen tape with interwoven copper strands is next applied to make contact between the conducting paper and the lead sheath which is then put on. It relieves the paper of heavy currents.

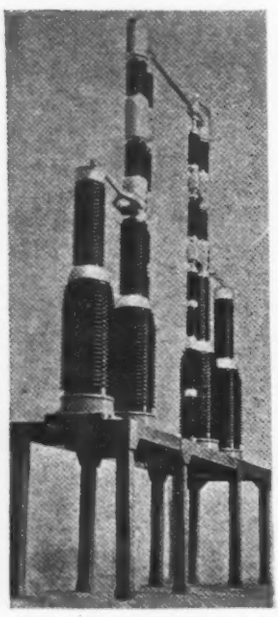
To withstand the high internal gas pressure the lead sheath over the dielectric is reinforced by lapping on copper tapes, a bedding of linen tape interwoven with copper threads being first applied to protect the sheath. A second linen protecting tape is next applied and another thin lead sheath may be added to provide waterproof protection for the reinforcements. The cable is finally equipped with external servings according to requirements.

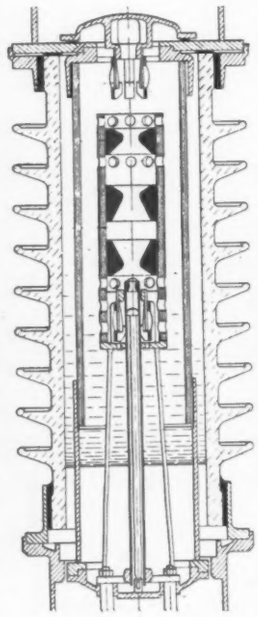
The current carrying capacity is approximately the same as that of other types. The supply of gas to the cable is maintained from both ends so that if the cable is opened for repairs or a leak develops dry gas will be fed from both sides of the point of opening and prevent moisture from entering.

•

Oil Circuit Breaker For 500 Kv.

European manufacturers seem to be sufficiently optimistic about higher operating voltages to have gone to the great expense of developing breakers for such higher voltages. One full-size, 500-kv. breaker is on exhibition at the Paris fair and is said to be the largest breaker in the world. It was designed and built by Ateliers de Construction Electriques de Delle, is of the so-called orthojetor type, is some 40 ft. high and consists of a series of four insulating columns per phase, mounted in one plane on a metal platform. There are four rupture chambers in series. The rupturing principle employed is that of forcing oil into the arc. No data are given for rupturing capacity and speed of operation.





500-kv. oil circuit breaker on exhibition in Paris

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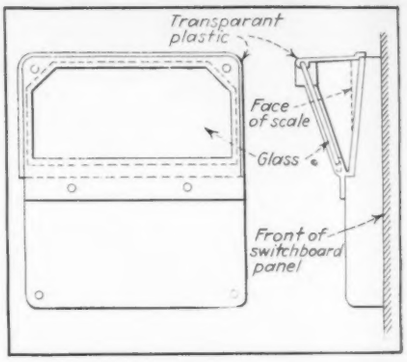
No Glare From These Glasses

By V. E. McCALLUM
Design Division, Engineering Department, Commonwealth Edison Company

Reflected glare from the glass covers or fronts on indicating instruments frequently makes life just a little more difficult for the switchboard operator. As he glances up at the wattmeter on Unit No. 3, for instance, he is quite likely to see a glare of light reflected from the glass in front of the instrument face instead of the pointer and scale on it. This difficulty has inspired much effort to achieve glareless lighting of switchboards, not all of which has been successful. In the recently completed central control gallery at Fisk Street station of Commonwealth Edison Company the lighting has had several revisions to improve what was intended to be a perfect job as designed.

Not the least part of the improvement derives from a change, not in the lighting itself, but in what is lighted. This change was made in the instrument fronts as appears in the accompanying sketch and picture. The instruments are flush mounted, their fronts as supplied by the maker parallel to and standing out about $\frac{3}{16}$ in. from the surface of the switchboard panel. Thus the glasses over the scales were vertical, in just the proper position for lighting glare to be reflected into the eyes of the operator. New fronts were made for instruments by cutting away the upper parts of the old ones and fitting on them the improvement shown in the sketch. The new parts are of a transparent plastic in which the glass is molded. The scale of the instrument is illuminated through the plastic and because of its inclined position there is no reflected glare from the glass.



Ingenious instrument front obviates reflected light glare

•

Sound Waves Sterilize Milk

Experiments at the laboratories of the Metropolitan Vickers Electric Company at Trafford Park, England, indicate that sound waves (not radio) in the nature of 100,000 to 1,000,000 cycles may be used for sterilization of milk and other purposes. One experiment involved (according to the *Electrical Review* of March 10, 1937) a 3.5-kw. water-cooled thermionic volve operated at 8 kv. producing 300,000 cycle vibrations in a large gold-coated quartz crystal.

ONLY THE L-M PVD CUTOUT GIVES YOU ALL THESE FEATURES

Inside Always Protected . . . The PVD Door stays closed with cartridge in closed or open position. Rain, sleet, foreign matter cannot enter the porcelain housing.

Positive "Tell-Tale" Indication . . . The PVD Cartridge in the "dropped out" position is readily seen from the distance, from every direction . . . no time lost in searching.

No Arcing at Contacts . . . The arc is cleared INSIDE the PVD Cartridge before contacts separate. Saves contact surfaces, insures cool operation . . . longer life

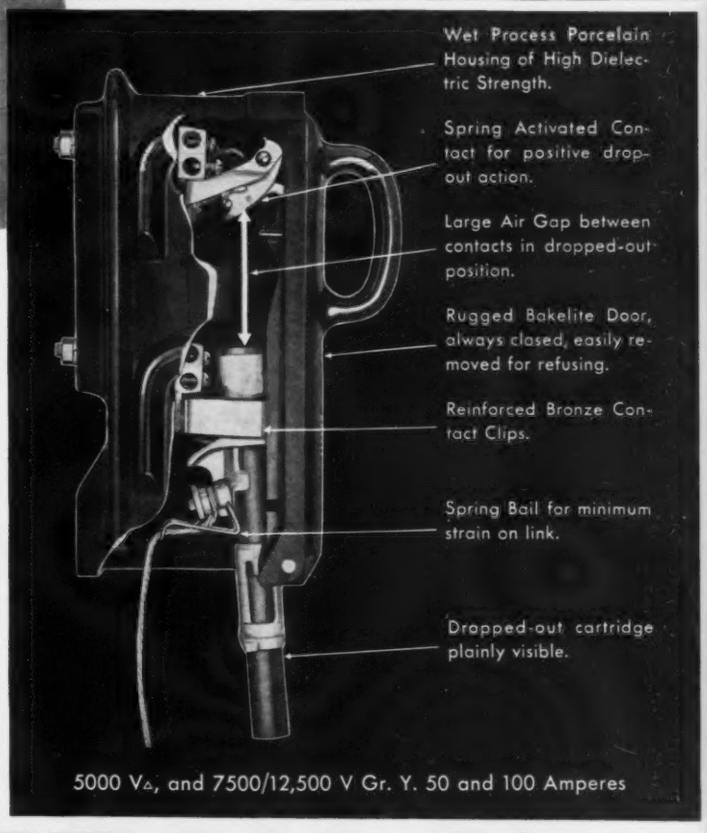
Wide Separation of Contacts . . . Drop-out action of cartridge establishes large air gap between contacts, eliminates re-establishing of arc . . . no leakage, no radio interference.

Dependable Performance . . . Gravity pull PLUS spring pressure force the cartridge into drop-out position. Metal-in-metal sliding action eliminates "sticking", insures SMOOTH, perfect operation of the PVD Fuse Cutout at all times.

"On Time" Operation . . . Exclusive PVD bail design minimizes strain on fuse link, prevents untimely blowing of a weakened link.

Safe Handling, Easy Re-Fusing . . . No live parts exposed at any time. Dead hinge door easily and SAFELY removed for re-fusing.

Ask your L-M Representative to show you other PVD "Sure Protection" Features.


Wet Process Porcelain Housing of High Dielectric Strength.
Spring Activated Contact for positive drop-out action.
Large Air Gap between contacts in dropped-out position.
Rugged Bakelite Door, always closed, easily removed for refusing.
Reinforced Bronze Contact Clips.
Spring Bail for minimum strain on link.
Dropped-out cartridge plainly visible.

5000 V$_{\Delta}$, and 7500/12,500 V Gr. Y. 50 and 100 Amperes

LINE MATERIAL CO.

News ABOUT PEOPLE

Johns-Manville Assigns New Executive Duties to Crosby

E. S. Crosby has been named president of the Johns-Manville International Corporation, according to an announcement by Lewis H. Brown,

Wide World

president of the Johns-Manville Corporation.

Mr. Crosby joined Johns-Manville in 1928 when it absorbed the Celite Company, of which he was vice-president and a director. His first position with J-M was as general manager of the engineering department. In 1929, when the Johns-Manville International Corporation was formed, he became vice-president and general manager. The presidency has been held by Mr. Brown.

•

▶ MORROW C. HENDERSON, Atlanta division superintendent of the Georgia Power Company, has returned to the engineering department of the Duquesne Light Company in Pittsburgh. Mr. Henderson left the Pittsburgh utility in 1927 to join the Georgia Power Company as distribution engineer. He was appointed Atlanta division superintendent in 1931. HARRY G. MOORE, who has been assistant superintendent of the Atlanta division since 1934, has been appointed to succeed Mr. Henderson as division superintendent. Mr. Moore joined Georgia Power in 1924 in Atlanta as a distribution engineer. In 1931 he was appointed assistant superintendent of the Columbus division. He was transferred from there to his present position.

•

Twin State Electric Group Names Hemenway President

Howard F. Hemenway, contractor, of Springfield, Vt., was elected president of the Twin State Electrical Association, recently organized at Bellows Falls.

Other officers elected were: Vice-president, C. P. Landry, contractor, of Claremont, N. H.; secretary and treasurer, A. J. Maranville, division manager Central Vermont Public Service Corporation, Windsor, Vt.; directors in addition to Mr. Landry and Mr. Maranville, H. G. DuCharme, district superintendent Central Vermont Public Service Corporation, Claremont, N. H., and John Crowley, electrical contractor at Bellows Falls.

•

▶ DAVID M. DEBARD, Stone & Webster Service Corporation, sailed August 19 from New York aboard the Swedish-American liner *Kungsholm* to spend six weeks abroad. Mr. DeBard will study sales and sales methods for electrical appliances. During his stay on the Continent he will visit the Scandanavian countries, Denmark, Germany, Belgium and France. He will return early in October.

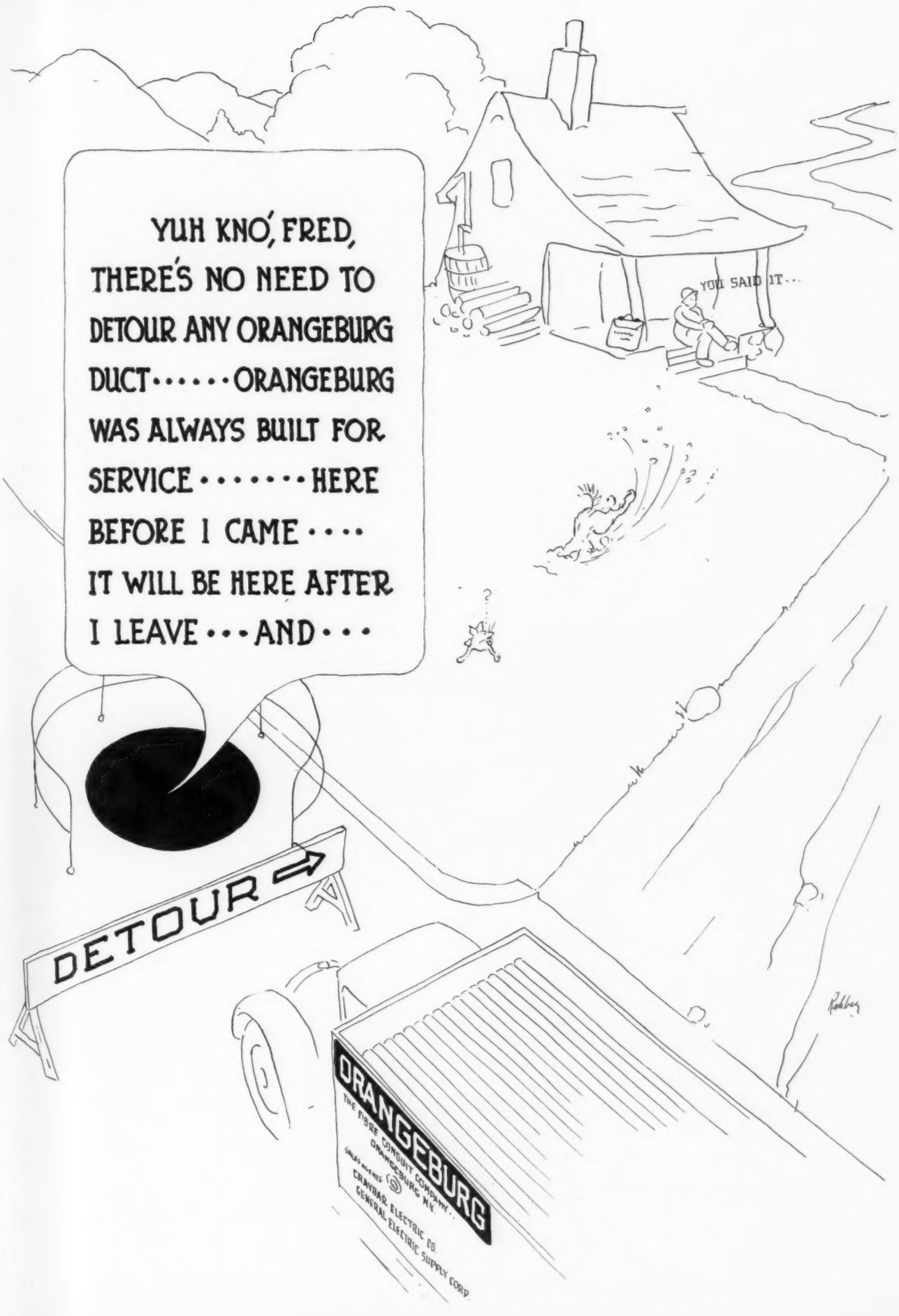
▶ RICHARD J. BEAMISH, member of the Pennsylvania Public Utility Commission, sailed this week for Sweden to study that country's utility system.

C. P. Golding Will Assume New Duties in Cambridge

Charles P. Golding general sales manager of the Western Massachusetts Companies, with headquarters in Springfield, will leave that organization's employ September 1 to take a position with the New England Gas and Electric Association of Cambridge, Mass. Graduated from Williams College and from Harvard School of Business Administration, he devoted several summer vacations to work for the Cambridge Electric Light Company and to engineering study and sales promotional work for industrial companies.

In 1929 he entered the public utility field in the research branch and made a market survey of the domestic and

commercial business of the United Electric Light Company. Subsequently he became superintendent of new business for the Western Massachusetts Companies, taking charge of all promotional work and directing the merchandising campaigns and contests which built up electric appliance sales in that field with remarkable success. Later he became general sales manager. His new duties in Cam-


YUH KNO', FRED, THERE'S NO NEED TO DETOUR ANY ORANGEBURG DUCT·····ORANGEBURG WAS ALWAYS BUILT FOR SERVICE·····HERE BEFORE I CAME···· IT WILL BE HERE AFTER I LEAVE···AND···
YOU SAID IT···
DETOUR
ORANGEBURG
THE FIBRE CONDUIT COMPANY
ORANGEBURG, N.Y.
SALES AGENTS
CRANDALL ELECTRIC CO
GENERAL ELECTRIC SUPPLY CORP

bridge will have to do primarily with management rather than sales promotion.

•

Wilbur B. Driver, Pioneer of Alloy Wire Industry

The nickel-chrome alloy industry is celebrating its thirtieth anniversary this year and Wilbur B. Driver, a pioneer in the American alloy wire industry, chuckles when he tells of friends who, back in 1907, advised him against engaging in the production of nickel-alloy, then newly developed. Fully conversant with the needs of the electrical industry, Mr. Driver immediately sensed the full possibilities of the new material. He secured manufacturing rights to it and in time merged with other interests to form

the Driver-Harris organization, of which he was president for many years. Later he took over the Gilby Wire Company, which has since been renamed the Wilbur B. Driver Company, with its plant at Newark, N. J.

Mr. Driver has just returned to this country after spending several months abroad. He stated that it is his impression that European electrical appliances lag behind us in design, value and volume of trade. "There's little originality shown by European manufacturers of electric heating appliances," he said. "So far as I could observe, they seem to wait for America to develop and introduce appliances which are promptly copied."

•

▶ E. M. PARKER, senior valuation engineer, New York Public Service Commission, has been appointed to the Chattanooga Electric Power Board, S. R. G. Finley, chief engineer for the board, has announced. Mr. Parker has had extensive experience in the designing, estimating and supervision of underground work and overhead electric systems. In the course of his career Mr. Parker has been identified with the Brooklyn Edison Company, the Westchester Lighting Company and the American Gas & Electric interests in Atlantic City, N. J.

▶ LEWIS M. SMITH, electrical engineer for the Alabama Power Company, has been elected chairman of the Alabama section of the American Institute of Electrical Engineers.

▶ GEORGE W. KABLE, chief of the rural electrification and engineering section of the agricultural industries department of the Tennessee Valley Authority, has resigned to become editor of *Electricity on the Farm* published in New York. Mr. Kable's resignation becomes effective September 1.

▶ PAUL VECKER, general sales manager Carolina Power & Light Company, Raleigh, N. C., has been appointed chairman of the sales section of the Southeastern Electric Exchange for the new administrative year. The first conference of the sales executives under Mr. Vecker's guidance will be held at the Vanderbilt Hotel, Asheville, N. C., September 9–10. H. E. Simpson, secretary-treasurer of the Florida Power & Light Company, and C. B. McManus, assistant operating manager of Georgia Power Company, were reappointed chairmen of the accounting and engineering and operations sections respectively.

▶ M. F. GILL, formerly co-ordinator for the Pennsylvania Power & Light Company, Allentown, has been appointed assistant to the president of the Kansas Gas & Electric Company, Wichita. Mr. Gill has had extensive experience in the public utility field. He has served as resident engineer on construction for the Texas Power & Light Company, Dallas, and later as office engineer and assistant chief engineer. After brief connections with the Stone & Webster Engineering Corporation, U. S. Army and the Phoenix Utility Company, he became assistant manager and subsequently manager of the Texas Electric Service Company. He spent seven years, 1928-35, as general superintendent of the Phoenix Utility Company, Allentown, Pa.

Blank & Stoller

George H. Jones

was the guest of honor at a testimonial dinner on August 2 given in commemoration of his fortieth anniversary in the service of the Commonwealth Edison Company. Starting as a wireman's helper in the construction department in 1897, Mr. Jones advanced through the ranks and was made manager of power sales in 1931. One hundred and thirty attended the dinner.

•

▶ S. J. HALLS of the British Columbia Electric Railway Company has been appointed honorary president of the Vancouver Electrical Association.

OBITUARY

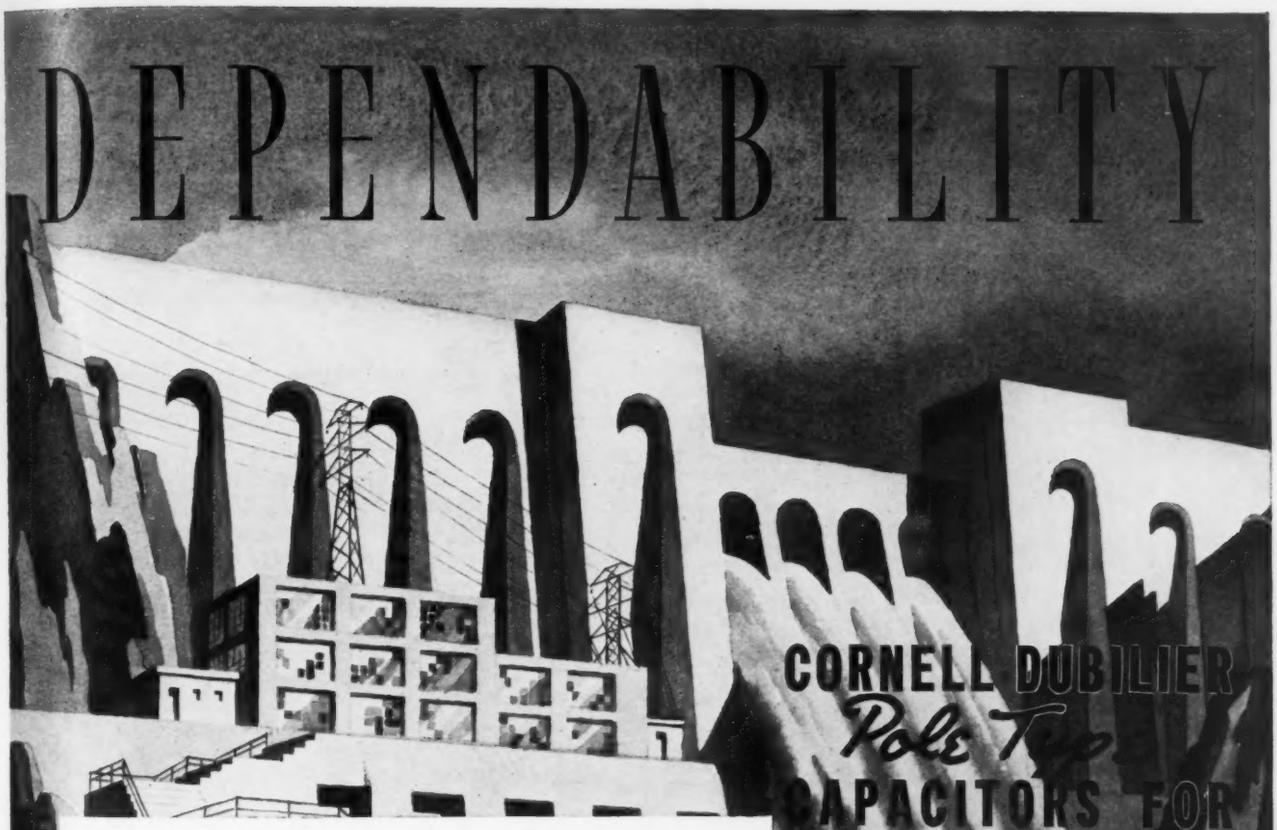
George R. Kerr

George R. Kerr, vice-president and treasurer of the Canadian Westinghouse Company, Ltd., died suddenly August 13, in his fifty-sixth year. Mr. Kerr was one of the original members of the Westinghouse Manufacturing Company, Ltd. When the Canadian Westinghouse Company was organized in 1903 Mr. Kerr was placed in charge of the accounting end of the business. In 1918 he was appointed treasurer and ten years later vice-president and treasurer.

•

▶ C. C. MCCONVILLE, superintendent of the Clintonville (Wis.) factory of the Four Wheel Drive Auto Company, died suddenly August 10 in his sixty-fourth year. A graduate of the University of Wisconsin, Mr. McConville had been associated with the Four Wheel Drive organization since 1916. He was a member of the Society of Automotive Engineers and was well known in automotive manufacturing circles.

DEPENDABILITY

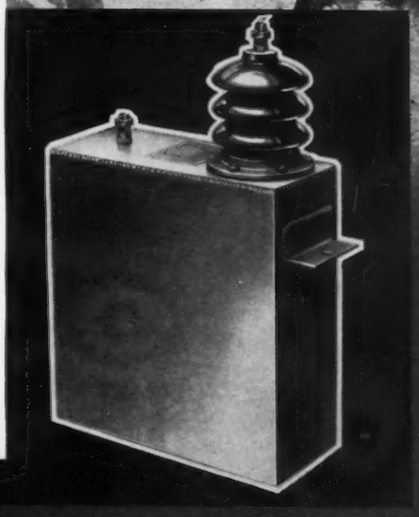


CORNELL-DUBILIER *Pole Type* CAPACITORS FOR POWER FACTOR CORRECTION

A MIGHTY stream is harnessed . . . giant generators send *power* humming across a network of transmission lines. Thousands of miles away you tumble a switch with your finger, tranquilly unaware of the electrical miracle which takes place. So *dependable* has the service of electricity become, the average consumer takes it entirely for granted.

CORNELL-DUBILIER engineers are proud to have made a vital contribution to the *dependable operation* of power systems. The pole-type capacitor for power-factor correction on distribution systems is one of the latest of a long line of Cornell-Dubilier *accomplishments* in making the transmission of electric current more economical and dependable. Hermetically sealed in weatherproof containers these capacitors can be mounted inexpensively right on the system poles. Requiring no maintenance, pole-type capacitors are already creating sufficient *savings* to amortize their cost within two years.

For the service of the field, CORNELL-DUBILIER has established engineering offices in the key centers of the country. A C-D engineer will gladly assist in the selection of suitable capacitors for power factor applications. Full technical data mailed on request. *For your convenience, use coupon below.*



WORLD'S LARGEST AND OLDEST EXCLUSIVE MANUFACTURER OF CAPACITORS

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Electric **CORPORATION**

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Please have your representative call ☐ *send catalog* ☐

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New EQUIPMENT AVAILABLE

Phasing Device

Said to provide a high degree of safety to the user, this phasing device consists of a detector unit, used alone for potential detection, and a coupling unit plus an insulated, flexible lead which is snapped on the lower ends of both units when they are

Phasing device; for circuits from 2,300 to 7,000/12,500 Y volts, grounded or ungrounded. **Railway & Industrial Engineering Co.**, Greensburg, Pa.

used together for phasing purposes. Detector unit consists of a bakelite tube about 20 in. long and 1 in. in diameter and contains a neon light visible through a slot in the tube. In detecting potential, the electrode at the upper end of the unit is touched *to* a bare conductor or a live contact under oil, or placed *near* an insulated, but not leaded, conductor, the neon glow indicating potential. Coupling unit is similar but contains no neon light. When the two units are used in phasing work the detector unit is touched to one phase of circuit No. 1 and the coupling unit touched to the other phases in turn. When the coupling unit is touched to the same phase as the detector unit the neon light in the latter disappears.

•

Steel Climbers

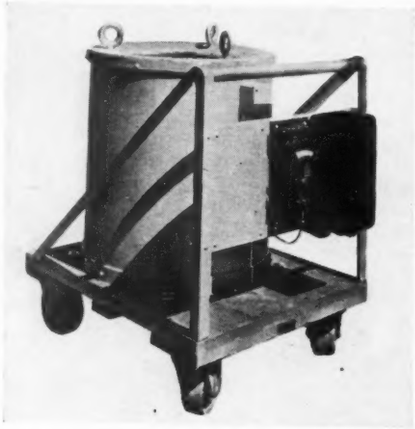
Designed to permit the climbing of steel work, including poles, with a minimum of effort and a maximum of safety, these newly developed climbers make use of cushion contacts which will not mar the painted surface. Worn strapped to the shoes, they need not be removed when walking from one steel pole or beam to another. They are also interchangeable on ordinary or reinforced poles or beams and are said to afford a safe grip regardless of the angle of contact.

Service safety climbers; steel construction. **Service Supply Corporation**, Philadelphia.

•

Melting Pot

This electrically heated babbit pot is so designed that it can be lifted clear of the heating elements. Heating elements are the company's "folded and formed" type, used for temperatures up to 2,470 deg. F.; maximum temperature contemplated in the melting pot is 1,000 deg. F. Themostat and magnetic switch mounted on truck control the temeperature. Temperature control is arranged to read from thickness of wall of pot, so input temperature does not exceed value which would dross the babbit.



Capacity 750 lb. for single phase; larger pots to handle up to 1,500 lb. of lead, for voltages of 115 to 440. **Harold E. Trent Co.**, Philadelphia.

•

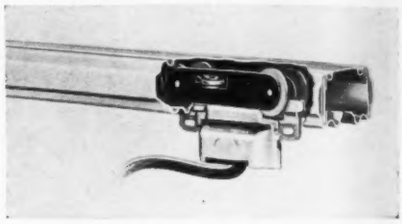
A.C. Welding Electrodes

Crucible-weld electrodes; 3/32 to 5/16 in. in diameter; special 1/16 in. size for use with low current values. **Westinghouse Electric & Mfg. Co.**, East Pittsburgh.

New coated electrodes have been developed for a.c. welding. Black electrodes are suggested for down hand butt welding and are said also to be satisfactory for horizontal fillets. Brown electrodes are offered for general purpose welding; horizontal, vertical and overhead work, and are said to be especially adapted for fillets, single or multiple pass. Arc stability, low spatter loss, high tensile strength and high ductility of deposit are claimed for all electrodes.

Mobile Distribution System

A new flexible, mobile electrical distribution system for general lighting and light duty power applications consists essentially of lengths of formed steel duct inclosing copper busbars partially wrapped in insulating material. Movable current-carrying



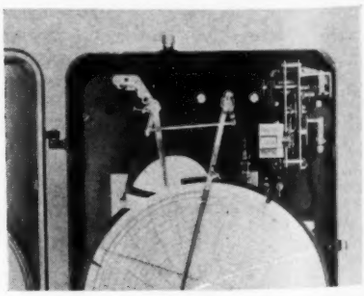
Universal type "Trol-E-Duct"; line is made up of 44 separate assembled items. **Bull Dog Electric Products Co.**, Detroit.

trolleys and stationary twist-out plugs, to which lights, tools and appliances can be wired, are inserted in a narrow, continuous slot extending along one side of the duct. Weight supports can be inserted in the duct to support lamp fixtures, portable tools and miscellaneous equipment.

•

Electric Integrator

A new electric integrator for flow meters totalizes flow every fifteen seconds. A flat disk cam is specially designed to compute mechanically the square root of the differential pressure across an orifice plate or venturi tube in a pipe line at fifteen-second intervals. Values thus obtained are total-



Integrating mechanism in upper right-hand corner; cam partly concealed by chart plate of meter. **The Bristol Co.**, Waterbury, Conn.

ized by means of a counter and indicated on a six-figure integrator dial. Integrating mechanism consists essentially of a continuously running telechron motor, which operates a counter through a train of gears. These are engaged and disengaged by means of a mercury switch and magnet. Motor operates counter only when gears are meshed.

SERVICE LIKE THIS

is all in our day's work

"Did you fly here?" Work in a Chicago shop, located eight miles from our warehouse, was held up for want of a Tube Cutter. They phoned us, and we got the Cutter there so quickly that the buyer asked our driver if he had used an airplane.

Ordered . . . measured . . . cut . . . delivered . . . in same day. A local concern phoned in the morning, asked us to come out and take some measurements for steel. We made the measurements, returned to our warehouse, corrugated 24 sheets and sheared 12 pieces of steel, delivered the order . . . all in the same day.

Our men were late for supper— but the customer got his order on time. A firm located 200 miles away phoned in at 5:30 for two CB sections. We cut and shipped the order that evening via truck.

YOU'LL LIKE *Scully Service*

●Whether it's an emergency, or run-of-the-mill order, you can depend on Scully. Our huge stocks are quickly available. We have immense stocks of steel, steel products, copper and brass always on hand in eight warehouses conveniently located. Try us!

Phone, write or wire the warehouse nearest you. Send for our complete Stock List and Reference Book. It's free!

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Warehouses at

CHICAGO • BOSTON • PITTSBURGH • NEWARK, N. J. • ST. LOUIS
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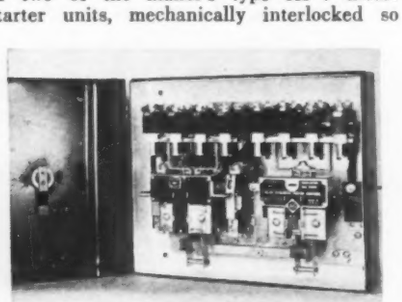
UNITED STATES STEEL

Reversing Motor Starter

This new reversing motor starter consists of two of the maker's type AP-7 motor starter units, mechanically interlocked so



Type AP-7-R; for 7½ hp., 550 volts, or less. **Allis-Chalmers Mfg. Co. Condit Works,** Boston.

that either unit cannot be closed if the other is closed. Starter units are equipped with "Ruptors," inclosing chambers which confine and depotentiate the arc formed by circuit interruption. Large silver double-break contacts, unit construction, inclosed temperature overload relays, provision for under-voltage protection are other features.

•

Welding Electrode Holder

Model "B-4"; 20 amp. capacity; for rods 1/16 to 3/16 in.; weight 15 oz. **Jackson Electrode Holder Co.,** Detroit.

This new welding electrode holder is said to combine light weight with maximum conductivity, to be easy to handle and to be small enough to be manipulated successfully in small places. It is made entirely of Mallory 3 metal; an alloy said to insure strength and to have 85 per cent of the conductivity of pure copper. Handle insulation is thoroughly ventilated; upper tong and compression spring insulated by fiber.

•

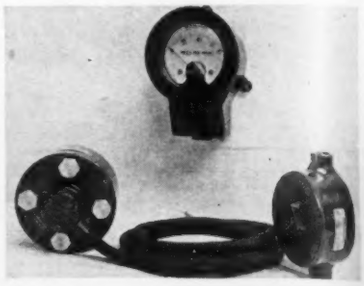
Reclosing Fuse Cutout

The reclosing door of this new fuse cutout contains two fuse holders. Should the first fuse link blow the door is pushed outward at the bottom. After a time delay of one second the other fuse holder with its link is connected, thus restoring service if the fault is temporary. Should the second fuse link blow the door drops open and is isolated from the circuit. Door with its reclosing mechanism is available as a separate unit to convert company's 50-amp. indicating and drop-out cutouts into reclosing units.

Sectional view, first fuse link blown; Model 9F6R1, rated 50 amp., 5,000 volts; also for 7,500/12,500 GR Y volts. **General Electric Co.,** Schenectady.

Locomotive Speedometer

A new a.c. speedometer for steam, Diesel and electric locomotives consists of three elements — an electric generator for axle

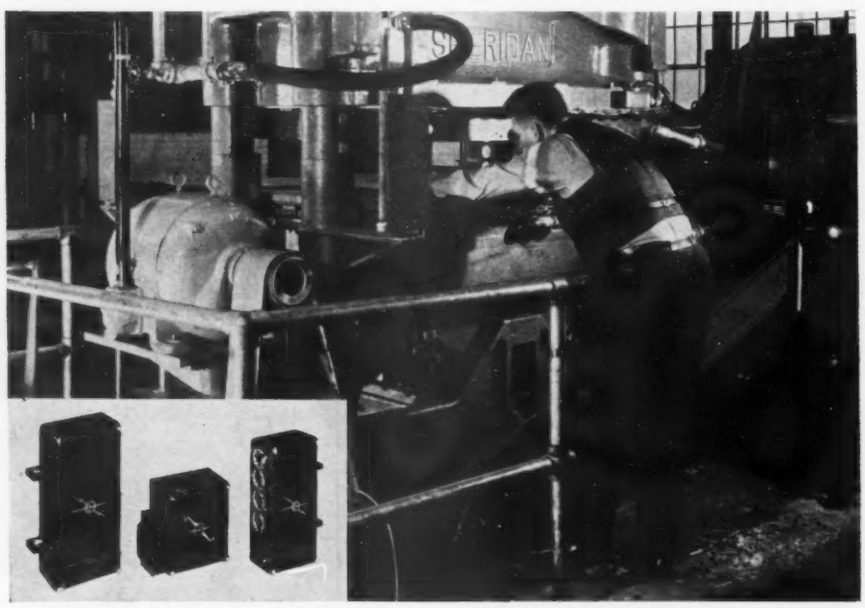


Left to right, electric generator, indicating instrument, junction box. This model for steam locomotives. **Westinghouse Electric & Mfg. Co.,** East Pittsburgh.

mounting, connected by wires to the indicating instrument in the cab, plus a junction box with a variable resistance to compensate for wheel wear. Because of the distance from wheels to cab, a mechanical drive cable such as used on automobiles may not readily be applied, so a generator whose output is proportional to the speed is mounted on the wheels.

Safety Control Equipment

Intended to serve a press operator as a control device as well as a protection device, this equipment consists of: (1) A light projector which projects a curtain of light, about 13 in. high and 2 in. thick, across the dangerous openings of a press; (2) photo-electric cell housing, containing four cells, which initiates electrical control by receiving the curtain of light; (3) photo-electric amplifier, which amplifies the impulses from the cell housing to proportions large enough to operate the necessary control devices. Press closes when operator moves out of the light path.



"Curtain of Light" safety control in use; equipment (shown at lower left), left to right, light projector, amplifier, photo-electric cell housing; designed for 115 volts, 50 or 60 cycles. **Electronic Control Corp.,** Detroit.

ENGINEERING DATA FROM MANUFACTURERS

Bulletins and catalogs now available to engineers by manufacturers and associations

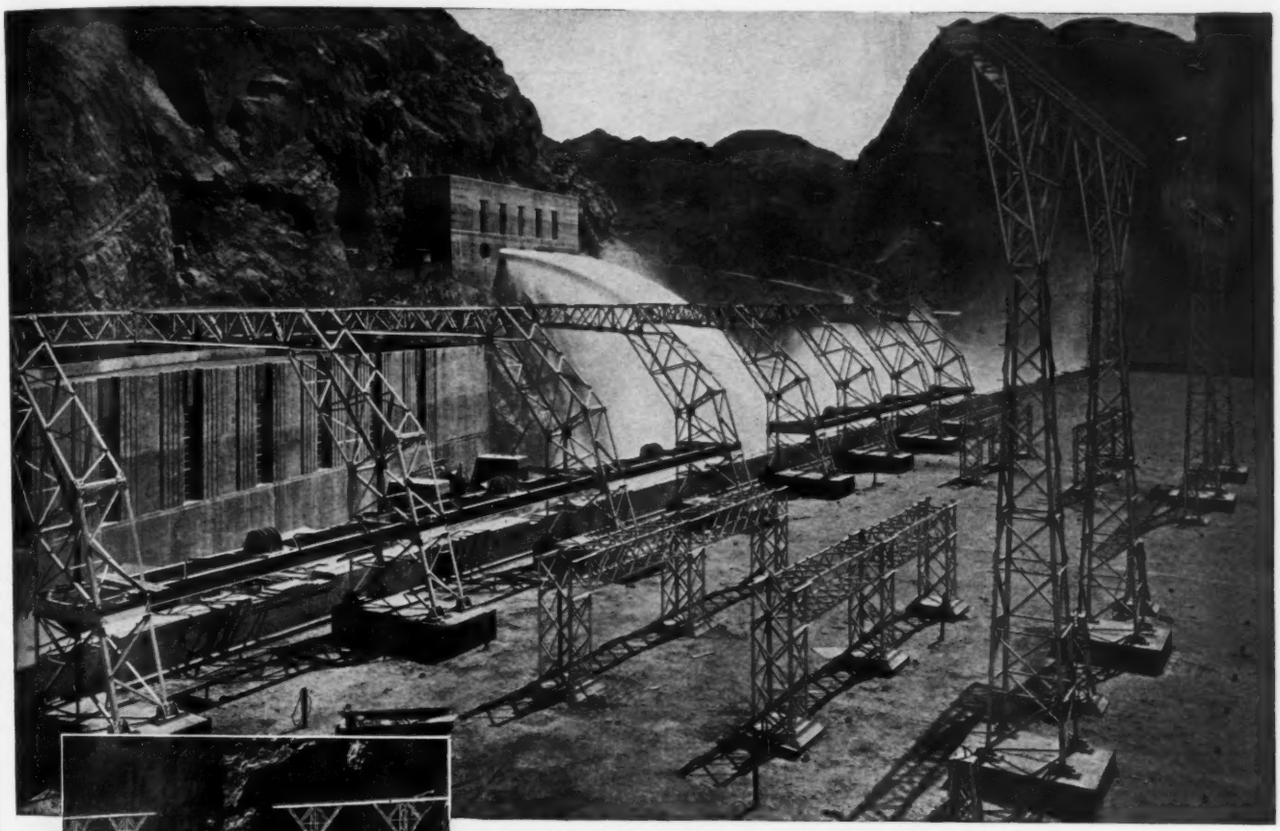
A. C. NETWORKS—"A. C. Networks Operation, 1934-35." Published by Edison Electric Institute, 420 Lexington Ave., New York, N. Y. 40 pages. Price, $1.60 in U. S. A. Network feed cables show better, and network protectors worse, performances than in the previous report in this comprehensive statistical résumé of the experiences with networks in 90 cities serving more than 1,000,000 kva. of peak load in 1935. Ratio of load to transformer capacity is increasing slowly after a decrease from 60 to less than 40 per cent.

WELDING CHART—The Lincoln Electric Company, Cleveland, has revised its drafting room chart on arc welding brought out last fall. Chart includes illustrations and particulars about the sixteen types of joints for arc welding, illustrated suggestions for better arc welded design, sketches explaining the nomenclature of welds and a comparison of welded and riveted drawings.

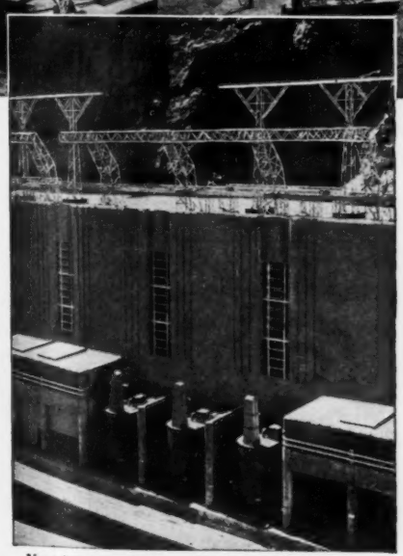
WATER TREATMENT—Bulletin N-96S-744A, issued by the Leeds & Northrup Company, Philadelphia, is entitled "To Improve Corrective Water Treatment" and describes features of equipment for automatically indicating and recording, or for indicating, recording and controlling pH.

LIBRARIES DIRECTORY—*Special Libraries Directory of Greater New York.* Available from Delphine V. Humphrey, librarian, McCann-Erickson, Inc., 285 Madison Avenue, New York. 90 pages, indexed. Price $2. Among the 389 entries there are some 40 libraries or associations or industrial corporation headquarters that are classed under technology and a large share of them contain electrical reference material. Librarians' names and telephone numbers are given along with indication of scope of the books and publications on file.

TAKEOFF TOWERS
start Power from Boulder Dam



Rising vertically, from the transformers, power lines are led to the overhanging towers at the left and onward to the tower frames at the right, for takeoff up the cliff to the switchyard on the canyon's rim. Center frames are for lightning arresters.



Nevada power house wing shows takeoff structure fabricated by American Bridge Company, with transformers in place below.

THROUGH power lines supported by this steel framework, on the roof of the Boulder Dam power house, electrical energy at 287 KV is started on its 266-mile journey to Los Angeles. This switch rack was fabricated by American Bridge Company, as was the structural steelwork for the heavily framed power house itself. And the twin transmission line to Los Angeles across the Mojave Desert, is carried on towers of the Rotated Type, a development by the American Bridge Company.

The Tower Department of the American Bridge Company has technical personnel, galvanizing facilities, and modern fabricating and erecting equipment for any tower or substation project you may have. In addition, there is available equipment for full-size tests of the largest towers in present-day use.

AMERICAN BRIDGE COMPANY

General Offices: Frick Building, Pittsburgh, Pa.

Baltimore · Boston · Chicago · Cincinnati · Cleveland · Denver · Detroit
Duluth · Minneapolis · New York · Philadelphia · St. Louis

Columbia Steel Company, San Francisco, *Pacific Coast Distributors* · United States Steel Products Company, New York, *Export Distributors*

UNITED STATES STEEL

Manufacturing AND MARKETS

Plan National Sales Drive on Appliances

A national co-operative advertising and sales campaign in behalf of electrically operated refrigerators is being formulated, according to reports in trade circles. It is planned to launch in the near future in Dallas, Tex., and one or two other selected cities in the Southwest test advertising and sales campaigns which will serve as a basis for a national drive.

The National Association of Ice Industries has been obtaining effective results from its promotional work and it is believed that a campaign for the electrical appliance industry would do much to maintain and even increase sales volume.

According to reports the test campaigns would run for a month or more with extensive newspaper advertising, billboard displays and dealers' sales drive used to arouse consumer interest in mechanical refrigeration. The national campaign for the 1938 selling season will start next spring.

•

Electric Machinery Awards

Among the government supply awards during the week ended August 12 were the following for electrical machinery:

McKiernan-Terry Corporation, Harrison, N. J., Navy, power units, $77,670; General Electric Company, Schenectady, War, dynamo meters, $63,760; Gould Storage Battery Corporation, Depew, N. Y., Navy, storage batteries, $19,782.

•

A.B. See Purchase Completed

Purchase of the A.B. See Elevator Company by the Westinghouse Electric & Manufacturing Company was formally completed when the See stockholders voted unanimously to dissolve the corporation. They had approved the sale of the properties previously.

Holders of 5,430 shares of A.B. See first preferred 6 per cent stock are to receive $100 in Westinghouse common stock, taken at market value, for each share. Remainder of the 10,000 Westinghouse common shares deliverable under the sale contract are to go to the two holders of 18,614 A.B. See common shares.

•

Manufacturers Issue Earnings Statements

Among the earnings reports issued recently by electrical manufacturing companies are the following:

Electric Controller & Manufacturing — Six months ended June 30, net profit, $466,931, equivalent to $6.59 a share on 70,855 capital shares, compared with a net profit of $213,486, or $3.01 a share in the first half of last year.

Easy Washing Machine — Six months ended June 30, net profit, $296,203, equal to 57 cents a share on the combined 518,615 shares of Class A and Class B stocks. This compares with a net profit of $334,756, or 64 cents a share on the combined Class A and Class B stocks, in the first of last year.

Eureka Vacuum Cleaner — Six months ended June 30, net profit, $103,704, equivalent to 43 cents a share on 240,395 capital shares, compared with a net profit of $155,862, or 65 cents a share on the stock, in the first half of last year. Twelve months ended June 30, net profit, $196,171, equal to 81 cents a share on the stock, compared with a net profit of $283,392, or $1.17 a share on the stock, for the preceding twelve months.

Cornell-Dubilier Electric—and its affiliate, the Condenser Corporation of America, net sales for the twelve months ended April 30, $2,986,653, as compared with $2,058,021 for the previous twelve months.

Continental-Diamond Fibre—Six months ended June 30, net profit, $323,625, compared with $229,971 for the first half of 1936. Net profit for second quarter of 1937 totaled $142,437, compared with $184,252 for the second quarter of 1936.

Maytag—Six months ended June 30, net profit $1,305,269. Net profit three months ended June 30, $689,064.

TVA Lets $2,000,000 Equipment Contracts

Contracts totaling more than $2,000,000 for turbines for power houses at Chickamauga and Guntersville Dams on the Tennessee River have been awarded by the Tennessee Valley Authority.

S. Morgan Smith Company of York, Pa., has been awarded a contract to design and furnish two 34,000-hp. turbines with governing systems and spare parts for the Guntersville Dam power project at a cost of $1,005,000.

A contract to design and furnish two 36,000-hp. turbines with governing systems and spare parts for the Chickamauga Dam power project, at a cost of $1,049,000, has been awarded to the Baldwin Southwark Corporation of Philadelphia.

The TVA made other awards totaling $243,100.

•

G. E. Gets $1,080,269 Order

Contracts totaling $1,984,634 for electrical equipment to be used in two additional generating units for the power house at the toe of the dam in Black canyon of the Colorado river have been awarded General Electric Company, Allis-Chalmers Manufacturing Company and Pacific Electric Manufacturing Corporation.

Amounts of awarded contracts: General Electric, $1,080,269; Allis-Chalmers, $808,898, and Pacific Electric, $95,467.

•

Domestic Refrigerator Sales Show 15 per Cent June Gain

Domestic sales of household electric refrigerators to distributors and dealers during the first six months this year totaled 1,586,449 units, valued at $135,925,937 as against 1,311,820 units, valued at $107,008,496, for the

Let's make medicine

the council fire is lit . . .

INTERESTING HOWS

HOW the Industrial Advertising Manager Can Function in His Public Relation Program.

HOW to Evaluate Publications—Methods of Qualitative and Quantitative Analysis

HOW to Use and Not to Use Industrial Motion Pictures

HOW to Develop and Maintain Industrial Mailing Lists

HOW to Secure Greater Effectiveness from the Advertising Dollar

HOW to Organize and Carry on Market Research Activities and How to Apply the Facts

HOW to Apply Showmanship and Add Sales Power to Industrial Copy

HOW to Write Better Letters and Use Them More Effectively

Prepared by The Buchen Company, Chicago

HOW! BROTHER

By smoke writing and carrier pigeon—by swift runner and heliograph, word has reached the council fire that the braves of many tribes are on the march and will assemble in full force at the big 15th Annual Pow-wow of the NIAA, September 22, 23, 24, at Chicago.

Important plans will be discussed—extensive exhibits of successful advertising and sales promotional material displayed and valuable "Hows" presented by industrial sales and advertising directors.

Of course, pleasure has had its full consideration—banquets, night clubs, bathing, golf—and bows and arrows for those who prefer.

Mr. H. D. Payne, Chairman, 2145 Walnut Street, Chicago, Ill., will gladly accept your reservation or send further information—write him.

NIAA

15TH ANNUAL ADVERTISING AND SALES PROMOTION CONFERENCE AND EXPOSITION
EDGEWATER BEACH HOTEL, CHICAGO
SEPTEMBER 22, 23, 24, 1937

first six months last year, as reported by the National Electrical Manufacturers Association.

World sales for the same periods were 1,710,690 units, value $145,242,845, as against 1,410,893 units, value $114,247,285. Domestic sales for June, 1937, were 249,042 units, value $21,098,696, as against 216,008 units, value $17,323,013, for June 1936.

The sales figures reported for 1936 in ELECTRICAL WORLD for August 14 should have been listed as 1935 data.

•

Manufacturers Make Sales Assignments

Electrical manufacturing companies have recently made the following appointments to their sales staffs:

Paul Weeks, who was manager of the Washington, D. C., office of Caterpillar Tractor Company until his transfer to the Peoria offices about two years ago, returns to the capital, relieving E. B. English, who as a newcomer to Peoria will become manager of federal and state sales. H. H. Howard, who has been in the employ of the company since 1926 in export and domestic sales capacities, has been appointed manager of the engine sales division.

Roller-Smith Company has appointed H. D. Seaton, Chattanooga, special agent in Tennessee. Ward Engineering Company, Jacksonville, has been appointed special agent for Florida.

Lincoln Electric Company has announced the opening of a new sales engineering office at Dayton, Ohio. The new office will be in charge of R. P. Sharer.

•

Circuit Breaker Contract

Contract for 49 oil circuit breakers, each 34.5 kv. rating, has been awarded to the Kelman Electric & Manufacturing Company by the Los Angeles Water and Power Commission for $261,750.

•

Electrical Facilities Expands

To handle its increasing business in laboratory apparatus and testing devices, Electrical Facilities, Inc., moved on August 20 to its new factory at 4224 Holden Street, Oakland, Calif.

New York Metal Prices

	Aug. 18, 1937 Cents per Pound	Aug. 24, 1937 Cents per Pound
Copper electrolytic	14.00*	14.00*
Lead Am. S. & R. price	6.50	6.50
Antimony	15.25	15.25
Nickel ingot	35.00	35.00
Zinc spot	7.60	7.60
Tin Straits	59.75	59.375
Aluminum, 99 per cent.	20–21	20–21

* Delivered Connecticut Valley.

Field Reports on Business

The drop in building construction has done much to level off business activity and has accentuated the seasonal decline. Utility purchases continue in steady volume. Electrical manufacturers report good business, although they are digging into the backlog of orders.

CHICAGO

General business activity in this section showed evidence of leveling off last week after a period during which the trend was definitely upward. Seasonal factors are still playing a predominant role in determining the rate of activity, which in a number f cases fell to the lowest point in the last six weeks. Wholesale orders showed a marked drop from the activity of the preceding two weeks, but the slump was not so precipitate as a year ago. Retail turnover, however, held closely to recent levels, and a sharp upturn is expected during the next few weeks when many vacationers will return.

Industrial production recovered part of the early summer decline and, unless advancing prices slow down buying, the outlook appears exceptionally good. Building construction is still running far below expectations, although several non-residential projects recently started have slightly improved conditions in that field. Store modernization is progressing at an increasing rate, materially benefiting the electrical business. One contract for $30,000 was awarded last week to cover wiring and fixtures in a large store-remodeling job. A bank of new elevators being installed in a large department store will amount to a sizable figure.

Electric range sales are slow, but radios, refrigerators and washing machines are selling in good volume. The demand for lighting fixtures and lamps is picking up. Motors and control equipment are steady and wire and cable sales are very good.

NEW ENGLAND

Orders for a wide range of electrical equipment indicate an encouraging trend in this district, which, while somewhat abated on account of a normal seasonal lull prevailing at this time, is by no means lacking in vigor. According to some reports it is probable that several industrial hydroelectric extensions will be announced for installation next summer after completion of some engineering details this fall on a number of projects in the northern area and that bids will be asked for waterwheels and generators in the near future.

Small motors are moving at a fair pace; one manufacturer records about 200 motors per week going to the machine manufacturers in Massachusetts. Recently about 500 hp. in motor-driven pumps for an eastern Massachusetts municipality were sold by a nationally known manufacturer. Heavy switching apparatus orders recently received by a prominent manufacturer include special control for heavy rolling duty in a new $2,500,000 Middle West steel mill.

Line material sales are confined to scattered orders for small insulators and hardware. A fortnight ago several small groups of distribution transformers were sold for installation in northern Massachusetts and New Hampshire. To date more than 25 per cent increase in commercial cooking power consumption as compared with last year at this time is noted in the Boston Edison area.

Proposals for new air-conditioning service for several floors of the Boston City Hospital have been passed. New street lighting for Haverhill, Mass., is proposed; further regulation of Boston street traffic by the addition of new traffic lights in the Roxbury district is planned. The Gamewell Company, Newton, anticipates further advance in municipal buying during the coming fall and reports a large increase in sales of electric signaling systems.

PACIFIC COAST

Increased power consumption throughout the Pacific Slope is reflected in orders for distribution transformers, substation material and in such heavy machinery as the order for $350,000 switchgears recently placed with the General Electric Company by Pacific Gas & Electric Company to handle its increased East Bay facilities. Other such orders largely to cope with increased service demands rather than for extension into new territory cover a 1,000-kva. transformer and a $125,000 Millbrae substation for Peninsula area, south of San Francisco; an 8,000-kva. G. E. transformer, value $15,000, for San Joaquin Valley, and $3,500 of disconnect switches, 150 instrument transformers and several carloads of poles for Los Angeles. A new transformer peak surpassing the spring irrigation season peak is being reached in shipments of sizes 2½ to 100 kva. from coast factories.

New industrial developments include $1,000,000 additions to the plants of Johns-Manville and Procter & Gamble in Los Angeles, covering respectively a 100 x 700-ft. building and extensions to the fish products and oil processing sections.

Prices on all staples are fairly steady, though such essentials as rubber-covered wire and conduit are recording occasional sub-market sales in the larger price brackets. The general tone of business is perceptibly better than that of mid-year.

NEW YORK

The seasonal lull in business continues, but optimistic notes have been sounded that activity in the fall will show an appreciable acceleration. The sharp drop in construction has acted as a damper on many lines. High wage rates in the building industry, together with high prices for materials, is blamed for the slump. Efforts are going forward to bring about an adjustment which would spur activity.

Electrical manufacturers are digging into backlogs, but are keeping plants operating at a high rate of capacity. Some fears have been expressed that manufacturers will be hard pushed to meet deliveries should another flood of utility equipment orders come in the fall.

Utility purchases have been steady. Appliance sales campaigns have been very gratifying. In some instances the consumer interest has been so aroused that new drives have had to be undertaken. The use of electricity has been expanded to such a degree that additional generating capacity must be installed in the near future.

Rural electrification is proceeding at a fast pace with several new extensions planned. Estimated farm income this year indicates that the farmer will have plenty of funds available for purchases.

General Electric Appoints Promotion Contact Men

Changes and additions in the advertising and sales promotion section of the specialty appliance sales division of the appliance and merchandise department of the General Electric Company have been announced by A. L. Scaife, manager of the section.

The new advertising and sales promotion contact men and the appliance sections they represent are: F. W. Chandler, domestic refrigeration sales; J. F. McBride, range and water heater, and F. J. Geib, dishwasher, disposal and unit kitchen sales. Art Smith continues in commercial refrigeration; Lawrence W. O'Brien joins the staff of *On the Top*, news magazine of the appliance and merchandise department.

•

P.R.T. to Spend $2,500,000; Trackless Trolleys Included

The Philadelphia Rapid Transit board of trustees recently voted to spend about $2,500,000 for the purchase of 40 trackless trolleys, 141 buses and 20 street cars.

Officials of the company have been directed to prepare specifications for the new equipment and to obtain bids directly from the manufacturers. Following this, the trustees will ask permission of the United States District Court for permission to make the purchases.

•

Emerson Gets U.S. Fan Orders

Emerson Electric Company recently announced that it had been awarded a contract by the procurement division of the Treasury Department for a large percentage of the government's fan requirements for the twelve months from September 1, 1937, to August 31, 1938.

•

Duro-Test Opens New Plant

Duro-Test Corporation, manufacturer of incandescent lamps, has assumed occupancy of its new plant in North Bergen, N. J., construction of which has just been completed. The plant operating at capacity will employ approximately 600 persons. The company's electrical power equipment is designed to act as an auxiliary unit to the utility system in North Bergen.

• He wondered WHERE THE FIRE HAD GONE!

Fire in a generator — The stationary engineer never saw any blaze disappear so quickly.

SPEED in killing fires is a "must" . . . Especially with costly electrical equipment.

LUX (carbon dioxide) is the fastest known extinguishing agent, yet dry and harmless to everything but fire. Many public utility men have found LUX to be their one best answer to the fire hazard problem. They rely entirely on LUX protection, supplementing built-in LUX systems for specific hazards with LUX portable extinguishers as first aid equipment.

A new brochure entitled "LUX Makes the Difference" will be off the press September 1st. Write for your copy.

Walter Kidde & Company, Inc.
80 West Street
Bloomfield, N. J.

LUX

For all electrical and oil fires

INSULATION HEADQUARTERS

FOLLOW THIS MAN

HE may be going into your plant! He is a Continental-Diamond engineer. He is versed in INSULATION problems. Of course he only goes where his help is requested so if you have an insulation problem, small or large, ask for the services of a Continental-Diamond engineer. We manufacture many kinds of insulating materials to cover countless electrical, thermal and mechanical problems, therefore our recommendations will be unbiased.

CONTINENTAL-DIAMOND FIBRE CO.

Newark, Delaware

Represented in Canada by DIAMOND STATE FIBRE CO. OF CANADA, LTD., TORONTO

DILECTO

A laminated plastic, commonly known as phenol fibre, made in sheets, rods and tubes or fabricated parts to specifications. Has high electrical insulation properties, great resistance to water, practically unaffected by oil or mild acids. It is a strong, tough material with a wide application for use in connection with modern electrical appliances.

DIAMOND VULCANIZED FIBRE

A tough, economical, insulating material made in standard sheets, rods and tubes. Can be readily fabricated or formed. A material of countless applications.

VULCOID

A thermo-plastic, non-hygroscopic insulating material made in standard sheets, rods and tubes. It is strong and tough, has good electrical insulating properties and is readily fabricated.

MICABOND

Thin splittings of mica bonded together with specially developed binders into standard plates, tubing or in formed rings, punched and sawed segments or other special parts. Micabond has high dielectric strength, is practically unaffected by acids, has high heat and moisture resistance, is readily punched, sawed or formed.

CELLULAK

A laminated form of insulating tubing, possessing extremely high dielectric properties, and marked resistance to flash-over.

DILOPHANE

A translucent, laminated plastic in colors. It provides perfect light diffusion, is not inflammable, and is manufactured in practically any color imaginable with either a glossy or dull finish.

7-TVA Set-up a Political Bonanza

[*Continued from page 48*]

Smith, in his patronage dispensing, has allied himself with Charles West, whose official title and payroll connection is Under Secretary of the Interior, but whose real job is admittedly liaison officer between the White House and Capitol Hill. West is a former Ohio congressman, with ambitions. And it is common gossip that Senator Bulkley, whose term expires next year, is no end worried by the political machine West is building in the Buckeye state, with the smiling approval of Smith and the benevolent disinterest of Hosford.

And this picture of political patronage with its attendant evils, unfortunately, human nature being what it is, is the logical result of any politically appointed and run commission—an accurate picture of what may be expected from the 7-TVA's.

•

Seminoe Dam Awards Placed

The Bureau of Reclamation, Denver, Colo., has placed awards for transformers for generating station at Seminoe Dam, Casper-Alcova project, Wyo., as follows: Four 2,500-kva. transformers, Kuhlman Electric Company, $25,776; four 667-kva. transformers, Pennsylvania Transformer Company, $10,040, and six 100-kva. and one 50-kva. transformers, to the American Transformer Company, $3,670.

•

June Vacuum Cleaner Sales

Vacuum cleaner sales for June, as reported by the Vacuum Cleaners Manufacturers Association, totaled 102,153 floor and 34,386 hand units.

•

"If and When" Ad Prepared

Consolidated Edison Company of New York has an institutional advertisement ready in local newspaper offices to be released after a storm which would darken the city and necessitate the use of electric lights. The copy discusses the question as to where the electricity for lighting business offices during the daytime comes from and explains how many reserve turbines etc., the company has available for all such contingencies.

Study Motor Requirements for Plant Changeover

[*Continued from page 34*]

partment or group of motors connected to a common feeder.

Upon completion of the study a tabulated report should be made showing the equipment required for each drive, and in sufficient detail so that the equipment can be identified for pricing if desired. A complete report would also indicate the probable monthly consumption for each section of the plant, together with the expected maximum demand and power factor from which the power cost could be estimated.

Flue Gases "Scrubbed Out" in Boston Edison Plant

[*Continued from page 37*]

settling tanks in the basement. Piping, fittings and valves at the tanks are of steel and cast-iron and are lined with rubber to resist the corrosive action of the scrubber wash water.

The solid matter is removed from the wash water in the settling tanks; the solids are dewatered and are then removed by means of a crane and clamshell bucket. The wash water from the scrubber is only slightly acid, but is extremely corrosive. As will be noted from above, only acid-resisting materials are used for handling the wash water and solid matter caught in the scrubber.

The installation has been relatively free from trouble and is removing the solid matter from the flue gases in a very satisfactory manner.

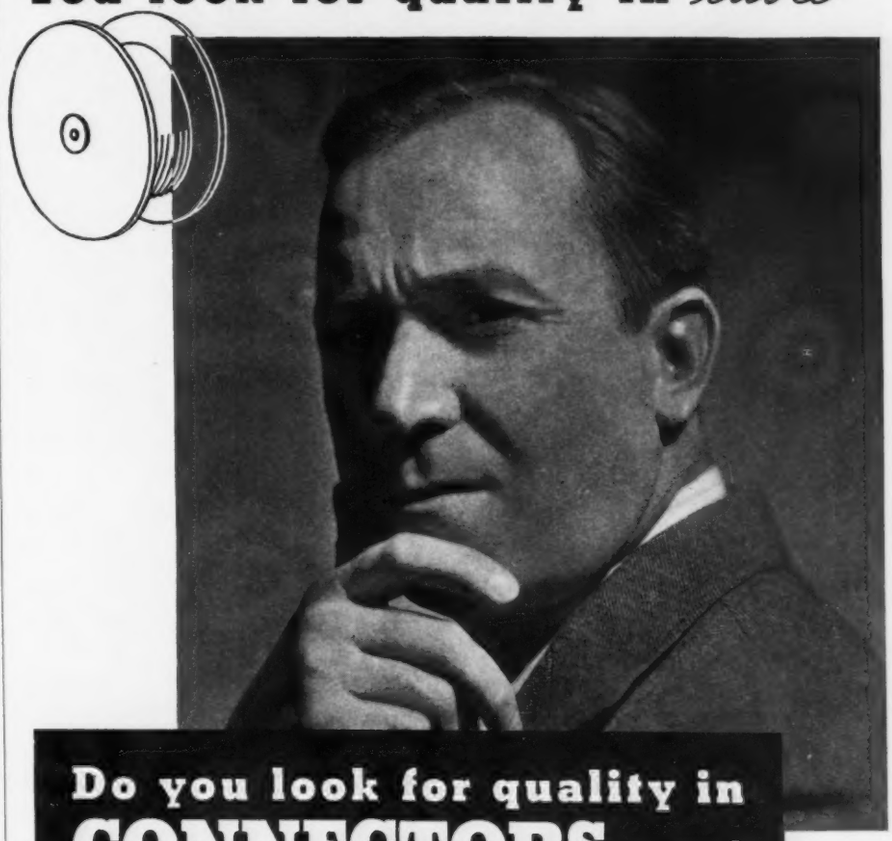
Schools Become Field Laboratories for Lighting

[*Continued from page 45*]

detracts, however unconsciously, from the students' willingness to work.

The work being done in Sausalito has its highest value in sight-saving, in eliminating many of those eye defects, developed during the school years, that affect more than 30 per cent of the population at the age of twenty. Certainly it has focused the attention of educators on the need for higher illumination. From the industry standpoint, the first experimental room represents a fourfold increase in connected load and more than that in energy consumption as the photocell control is far more strict than the teacher's eye in selecting the time when artificial illumination is necessary.

You look for quality in *cable*



Do you look for quality in CONNECTORS, *too?*

Overhead or underground, connectors are a vital part of your distribution systems. As important as your cables, transformers and circuit breakers.

When you specify connectors, specify the manufacturer who specializes in connectors—Burndy. Safe, dependable performance . . . substantial savings in installation time . . . flexibility to changing requirements—all are built into Burndy Connectors.

Left: The Burndy Mole for Underground Cable Connections Eliminates wiped joints, soldering of cable lugs, costly junction boxes and highly skilled labor; speeds up service taps and secondary connections, resists deteriorating oils, gases, acids, alkalis.

BURNDY
ENGINEERING CO., INC.
459 E. 133d STREET NEW YORK, N. Y.

For the GOOD of the SERVICE

ELPECO'S line of U-Bolt Pipe Fittings are strong, adjustable and require no pipe threading.

As a labor-saving device, and giving maximum strength for pipe structures, they fill a definite requirement.

Made in many types — enameled or galvanized finish.

ELECTRIC POWER EQUIPMENT CORP.
412 North 18th St.
PHILADELPHIA PA.

Application of Automatic Shunt Capacitors

[*Continued from page 39*]

control devices mounted on a panel in the upper compartment and the contactor in the oil-filled lower compartment. Housings are suitable for pole or wall mounting.

By keeping capacitor and automatic control separate, a desirable flexibility of installation is obtained in so far as the control unit may be readily removed for use elsewhere, if in the future a solid non-automatic connection of the capacitor should be found expedient. The unusual requirements of switching the capacitors in at very low voltage on the aforementioned 11-kv. open-end loop made it necessary to design the closing coils with a lower-voltage limit of 75 per cent to insure dependable operation.

Operation of the major devices of the two-stage installation is shown in Fig. 5.

With the transfer switches of both units (43-1) and (43-2) in the "automatic" position with contacts (1-2) closed, line voltage below the predetermined value will cause the primary relay (58) to close its contact (58R) and complete a circuit from the operating power supply (1-A) through the coil of time delay closing relay (2-1) back to power supply (1-B). If the line voltage remains low for the time set on the time-delay relay, this device will close its contact (2-1) and complete a circuit from (1-A) through the coil of the auxiliary contactor (52X-1) and an auxiliary "b" contact to (1-B). The auxiliary contactor will close its contact in the circuit to the closing coil of the main contactor (52-1).

Upon closing of the main contactor and connecting its capacitor to the line, the now closed interlocking auxiliary "a" switch (52a-1) completes a power supply circuit to the coil of the time-delay closing relay (2-2) of the second unit, but only in case the contact (58R) of the primary relay is kept closed by sustained low line voltage. The second unit will then repeat the closing operation of the first unit. However, if the voltage relay contacts have opened due to restoration of the desired voltage level by the first capacitor, the second capacitor will not be switched on.

Automatic tripping is accomplished in a way similar to automatic closing; when the line voltage rises above the upper setting of the voltage relay, contact (58L) is closed and unit 2 is tripped first, thereby closing an auxiliary "b" contact (52b-2). Then, if contact (58L) remains closed on voltage that is still too high, unit 1 is tripped.

For manual closing and tripping of either unit its transfer switch is thrown to the "close" or "open" position, respectively. The tripping device of the 7,500-volt equipment

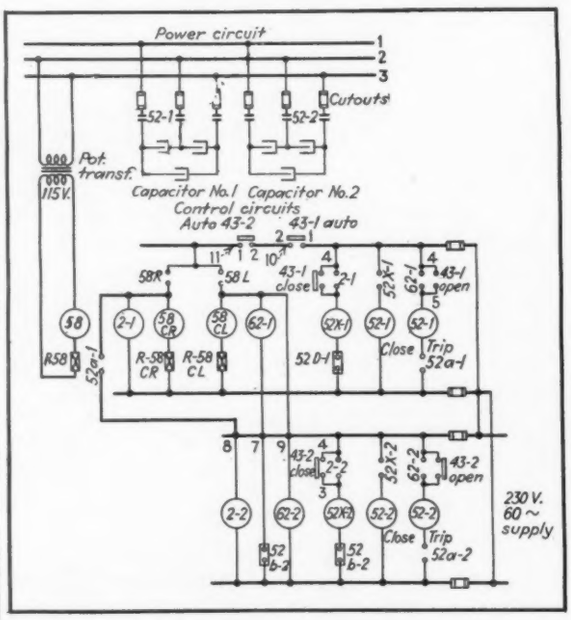


Fig. 5 — Two-stage, 300 amp. capacitor switching units with voltage control

The control transfer switches are operated by hand, other devices by a.c.

Device No.	Description	Operated By
2-1	Time-delay closing relay for Unit 1	A-C
2-2	Time-delay closing relay for Unit 2	A-C
52-1	Master switch for Unit 1	A-C
52-2	Master switch for Unit2	A-C
52-X-1	Aux. contactor for closing Unit 1	A-C
52-X-2	Aux. contactor for closing Unit 2	A-C
43-1	Control transfer switch for Unit 1	Hand
43-2	Control transfer switch for Unit 2	Hand
58	Voltage regulating relay	A-C
62-1	Time-delay opening relay for Unit 1	A-C
62-2	Time-delay opening relay for Unit 2	A-C

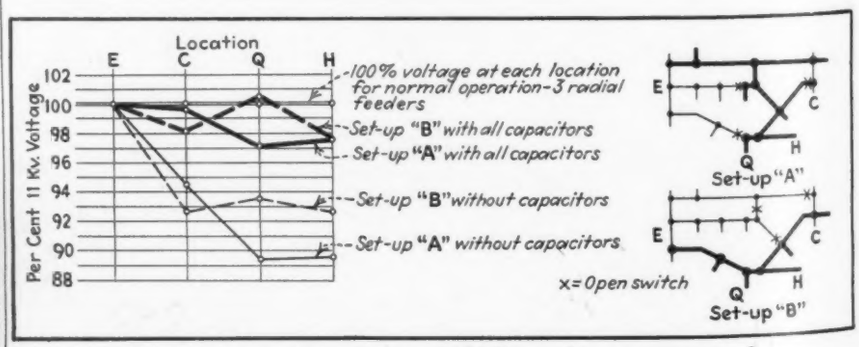


Fig. 6—Automatic capacitors hold line voltage near normal

is a shunt trip coil. The 5,000-volt units, having no trip coil, are tripped by breaking the power circuit to the master contactor coil.

Superior to regulators or boosters

To illustrate the effect of the capacitors on the 11-kv. line voltage, typical voltage conditions of two different emergency feeder set-ups are compared with "normal" voltages in Fig. 6. Those voltages on the 11-kv. side of points "C," "H" and "Q" have been selected as "normal" (100 per cent in the diagram) which prevail during normal operation when the district is served over the three separate radial feeders and the 180-kva. "C" capacitor, one 120-kva. "H" capacitor and one 150-kva. "Q" capacitor are in operation. The respective system and load connections are as given in the accompanying sketches, which are reproductions of Fig. 1. In both set-ups all capacitors are in service to hold the 11-kv. line voltage near the normal level.

The nature of the problem eliminated voltage regulators or boosters entirely from consideration. Other facilities, such as additional supply feeders, for obtaining results equal to the effect of the capacitors would have cost about twice as much as the combination of tie line and automatic capacitors. It is estimated by the writer that the ultimate cost of installing the automatic capacitors will be about $20 per kva. for a total of 780 kva., including 60 kva. in additional capacitor elements, for which extra space has been provided in the capacitor housings at "Q." This cost, of course, does not include the tie line.

•

Study Vertical-Shaft Pumps at California University

A laboratory for the study of vertical-shaft pumps has been established by the department of mechanical engineering at the University of California. The research program has been worked out in co-operation with the division of agricultural engineering and the division of irrigation investigations and practice of the College of Agriculture and with the pump manufacturers.

Manufacturers interested in participating in the work are requested to write to Prof. M. P. O'Brien, department of mechanical engineering, University of California, Berkeley.

Before you buy *Consider these facts*

All Pennsylvania Transformers have fundamental improvements which provide the maximum in service, economy and safety!

- All coils are circular, and so balanced that there is no tendency for radial or axial distortion under short circuits.
- Coils have low temperature gradient between copper and oil, a feature which permits heavy overloads with safety.
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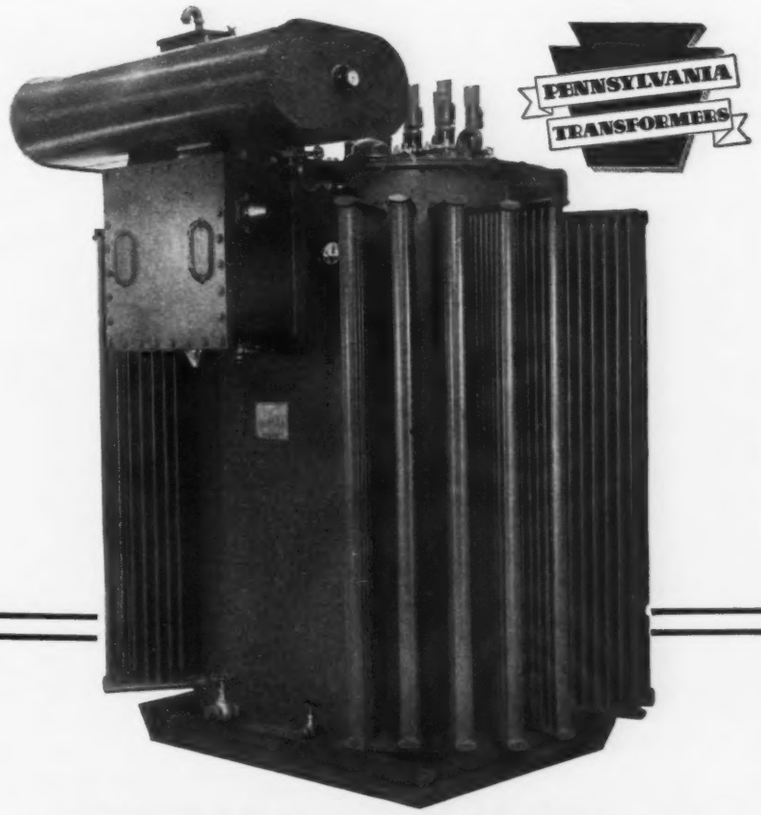

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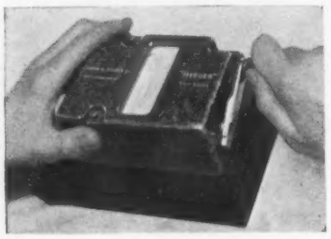

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ELECTRICAL INSTRUMENTS

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Recent Rate Changes

WORCESTER COUNTY ELECTRIC COMPANY has filed with the Massachusetts Department of Public Utilities a new schedule of rates, effective September 1, which will result in an estimated saving of $200,000 annually to consumers. The filing of a new rate schedule was in accordance with provisions of the department's order of approving the consolidation of Webster and Southbridge Gas & Electric and Worcester Electric, subject to the rate reduction amounting to approximately $150,000 annually for Worcester Electric consumers and $50,000 annually for Webster company users.

SYRACUSE LIGHTING COMPANY has filed a revision of its electric rates applicable to residential use in all of its rural districts, except the Seneca River district, with the New York Public Service Commission. The change will mean a saving of approximately $4,000 annually to electric consumers in the territory which includes a part of the city of Fulton, the villages of Chittenango, Fabius, Tully, Central Square, Cleveland, DeRuyter, Baldwinsville, Hannibal, Phoenix, Mexico and Parish and adjacent towns.

SOUTHWESTERN LIGHT & POWER COMPANY'S new rate schedule placed in effect August 1 in 73 cities and towns of western Oklahoma has been approved by the Oklahoma Corporation Commission, Chairman Reford Bond has announced. The average reduction will be 4.7 per cent, he said. The report to the commission shows the annual revenues to the company from these cities and towns totals $750,269. This will be reduced by $34,902 annually by the rate reduction.

SOUTH PENN POWER COMPANY has filed with the Pennsylvania Public Utility Commission electric rate reductions in five counties. The decreases in residential rates in Adams, Bedford, Franklin, Fulton and Somerset counties, which become effective October 1, are: Schedule A—One-half cent per kilowatt-hour in the first block and reduction of the number of units in the second block from 75 to 70 kw.-hr., together with the elimination of the demand provision. Schedule B—Units in first block changes from 30 to 35 kw.-hr. and the rate reduced ½ cent per kilowatt-hour. The number of units in the third block are reduced from 100 to 95 and the discount is reduced from five to four mills. Shedule AR—Reduction of first block rate 1 cent per kilowatt-hour and third and fourth blocks of ½ cent per kilowatt-hour. Reduction of rural minimum charges from $1.85 to $1.60. Units in the first block are changed from 40 to 45 kw.-hr. and in the second block from 75 to 70. Schedule BR—Reduction of rate in the first block 1 cent per kilowatt-hour and third and fourth blocks ½ cent. The units in the first block are changed from 30 to 35 kw.-hr. and in the third block from 100 to 95 kw.-hr.

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Commission Cites Utility

Illinois Commerce Commission has cited the Central Illinois Electric & Gas Company to show cause why its electric rates should not be reduced. The commission also demanded that the utility show cause why the company should not be ordered to desist from payments of dividends on its common stock, a practice which the commission said violated section 27-A of the Public Utility Act. Paul J. Raver, of the commission, maintained that the company announced a 13 per cent dividend last year on the common stock, all of which was held by the holding company, Consolidated Electric & Gas Company, Jersey City, N. J.

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Municipal Plants

CLEARWATER, FLA.—City is contemplating the purchase of the electric distribution system from the Florida Power Corporation, and has asked the utility company for its price for the system. The city already owns and operates its own gas plant.

COLUMBUS, MISS.—City Council has ordered an election for September 14 to determine if a $281,000 bond issue should be offered to purchase the distribution system of the Mississippi Power Company or to construct a new system.

NAVASOTA, TEX.—City commission has abandoned the project of constructing a municipal electric light and power plant and water works system and has granted the application of the Gulf States Utilities Company for a renewal for twenty years of its franchise. Navasota is the western terminal of the company's 66,000-volt transmission system. The waterworks system has been rebuilt since the 1913 franchise and the company asked for renewal of the franchise before undertaking further improvements.

PLAIN, WIS.—Wisconsin Public Service Commission has disapproved the sale of the village electric plant to the Wisconsin Power & Light Company, declaring that "the interests of the village and of the residents thereof will not be best served by the sale." One of the reasons given by the village for desiring to sell was that additional generating facilities and rural lines will be needed for 40 to 60 farmers reported to desire service and it did not believe additional investment would be justified by additional revenues that could be secured. The decision marked the first time that the commission has disapproved a sale of a municipal plant to a privately owned utility under provisions of a statute passed 20 years ago, which requires that a town, city or village submit the sale agreement to the commission before a referendum is held on the proposed sale.

BATH, N. Y.—Village has filed reductions in electric rates of the municipal plant which will save customers $3,215 annually. The changes are effective September 1.

LITTLE VALLEY, N. Y.—A general reduction of rates for electricity supplied by the municipal plant has been filed with the State Public Service Commission. It is estimated that the reductions will save consumers $2,462 annually, of which $1,247 will be saved by residential and general users inside the village and $1,063 will be saved by power customers inside the village and $152 will be saved by residential and general users outside the village.

BOONVILLE, N. Y.—Village has filed reduced electric rates with the state Public Service Commission to be made applicable to the territory which the municipal plant serves outside the village. The changes in the rural extension rates of the village plant will bring the rates more closely in line with those of the Northern New York Utilities Company in similar and adjacent territory and will save 255 customers of the municipal plant outside the village a toal of $1,176 annually.

BOOK REVIEWS

Statistical Year-Book of the World Power Conference; No. 1

Published by the Central Office of the World Power Conference, London. Obtainable through the American National Committee, World Power Conference, Interior Building, Washington, D. C. 111 pages. Price, $5.

This book brings together statistics on power resources, development and utilization for all countries for which comparable information could be obtained. This includes production, imports, exports and consumption of various kinds of fuels—coal, wood, petroleum, alcohol—available and developed water power, production and utilization of electricity. Unfortunately, the year for which the fullest information is given, 1933, was a period of subnormal activity in most countries, and the data for 1934 are less nearly complete. The latter fault will no doubt be remedied in subsequent numbers of the Year-Book, when the missing information shall have become available. In such an undertaking a serious time lag in publishing the first compilation was probably unavoidable. Meanwhile the book stands as the first and most authoritative collection of comparable world-wide information in its field.

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Kurzschlussströme in Drehstromnetzen

(Short-circuit currents in polyphase systems)

By M. Walter. Published by R. Oldenbourg, Munich. 146 pages, 107 illustrations. Price, 6.50 reichsmarks, less 25 per cent discount outside of Germany.

Engineers who have occasion to work out problems arising in connection with short circuits should find this book helpful. Various conditions are discussed under which these may occur, and methods are given for computing their magnitude, mechanical stresses and heat developed, and for controlling them. The mathematical treatment is simple, attention being directed to the application rather than to the deduction of the equations used. The author has considered the needs of readers who lack experience in this field by including detailed solutions of a number of typical problems.

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Elements of Electricity

By William H. Timble. Published by John Wiley & Sons, Inc., 440 Fourth Avenue, New York City. 569 pages, illustrated. Price, $3.

This introductory text, a complete revision of one of the well-known "Timbie" books on electricity, affords a sure foundation on which to build advanced courses and yet provides a practical course for the man who goes no further with the subject. It is confined to treatment of principal fundamental ideas rather than a discursive treatment of many. Major emphasis is placed on direct-current theory, but the book also covers alternating-current generation, distribution and utilization. Major changes in the third edition are in the discussion of electronics and vacuum tubes. This section of the book covers the theory and application of a number of the newer industrial vacuum tubes.

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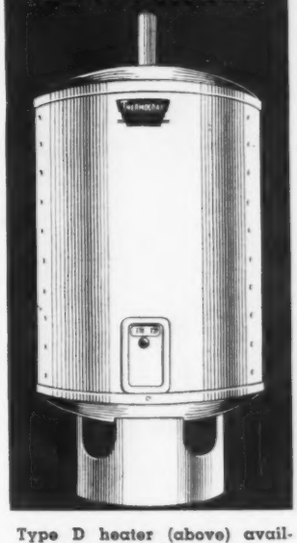

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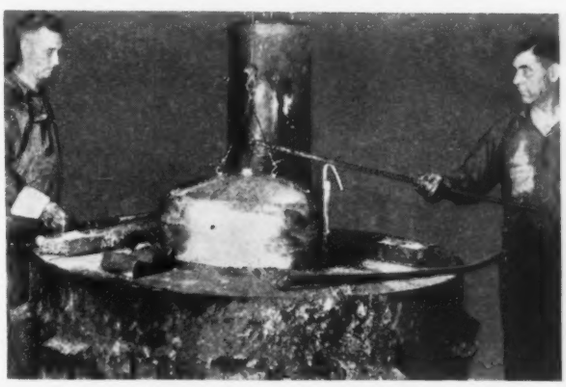

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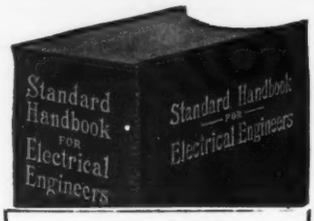

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Batteries
Wire Telephony and Telegraphy
Radio and Carrier Communication
Electron Tubes and Electric Wave Filters
Miscellaneous Electrical Applications

Sales Opportunities

HUNTINGTON, W. VA.—Appalachian Electric Power Company, Roanoke, Va., plans new power substation in southern part of Huntington, where site has been selected, with extensions and betterments in present local power substations, including equipment installation. Extensions will be made in transmisison lines for connection with new station, and additions and improvements made in local distributing system. Entire project will cost close to $450,000. Work is scheduled to begin soon.

DENVER, COLO.—Bureau of Reclamation, Custom House, Denver, receives bids until September 7 for two 230-kv. three-pole disconnecting switches and for two 230-kv. outdoor type lightning arresters for Boulder power plant, Boulder Canyon Project, Arizona-California-Nevada (Specifications 960-D). (Equipment will be assembled and installed by government.)

CHICAGO, ILL.—Visking Company, 6733 West 65th Street, plans installation of motors and controls, conveyors and other equipment in new one- and two-story addition to cellulose materials plant plans for which will proceed at once. Cost over $400,000.

CRAWFORDSVILLE, IND.—Has preliminary plans for expansion and improvements in municipal electric power plant, including installation of new 5,000-kw. turbo-generator unit, boilers and auxiliary equipment. Cost estimated about $285,000.

ROCHESTER, MINN.—Peoples Cooperative Power Association, Frank Kiley, Rochester, project supervisor, has plans under way for primary and secondary lines for rural electrification in Olmstead and neighboring counties, totaling about 150 miles, with outdoor power substations and service facilities. Fund of $55,000 has been secured through federal aid for initial allotment of about 50 miles, and additional appropriation to make gross sum of $163,000 will be obtained later. Ellerbe & Company, First National Bank Building, St. Paul, Minn., are consulting engineers.

LANSING, MICH.—Motor Wheel Company, East Saginaw Street, plans installation of motors and controls, conveyors, electric hoists and other equipment in two new one-story additions to automobile wheel and heavy metal stampings plant, totaling close to 90,000 sq.ft. floor space. Cost about $250,000.

CORNING, IOWA—Receives bids until September 7 for Diesel engine-generator unit, 575-725-hp., and auxiliary equipment for installation in municipal electric power plant, where extensions and improvements will be made. Cost about $50,000.

TROY, ALA.—South Alabama Electric Membership Corporation, Troy, plans extensions in rural electrification system, approximating about 300 miles of primary and secondary lines, with outdoor power substation and service facilities, for which fund of $310,000 has been secured through federal aid. This will make a total of close to 800 miles in entire system, for which gross fund of $670,000 has been obtained to date.

IDAHO FALLS, IDAHO—Has arranged for purchase of local hydroelectric generating station of Utah Power & Light Company, and will convert for municipal operation. Plans are under way for extensions in electrical distributing lines, with service facilities in additional territory.

PORTSMOUTH, VA.—Bureau of Yards and Docks, Navy Department, Washington, D. C., receives bids (no closing date stated) for one Diesel engine-electric unit, including 325-hp. engine and 200-kw. d.c. generator for floating crane at Norfolk Navy Yard, Portsmouth (Specifications 8545).

ST. LOUIS, MO.—Union Electric Light & Power Company has filed plans for new two-story and basement indoor type power substation in Northland district, and will begin work on superstructure at once. It will be known as Substation No. 25. Klipstein & Rathmann, 316 North Eighth Street, are architects.

TOLEDO, OHIO—Electric Auto-Lite Company, Champlain and Mulberry Streets, plans installation of motors and controls, regulators, conveyors and other equipment in new addition to automobile starting and lighting apparatus plant, 100 x 200 ft., for which superstructure will begin soon. Cost close to $150,000.

WEST POINT, NEB.—Cuming County Rural Public Power District, West Point, has plans for primary and secondary lines for rural electrification system in Cuming, Wayne, Stanton and neighboring counties, totaling about 400 miles, with power substation and service facilities. Cost about $450,000. Initial installation will approximate 250 miles, for which appropriation of $250,000 has been secured through federal aid, remainder of fund to be obtained later. O. R. Toman, Barkley Building, Lincoln, Neb., is consulting engineer.

WHEELING, W. VA.—Has engaged Carl J. Simon, Van Wert, Ohio, consulting engineer, to make surveys and estimates of cost for a proposed municipal electric power station. Harry Humphrey is city manager.

GRASSELLI, N. J.—General Aniline Works, Inc., 435 Hudson Street, New York, N. Y., plans installation of motors and controls, conveyors, regulators and other equipment in new additions to aniline dye and color plant at Grasselli, near Linden, for which superstructure is scheduled to begin at once. Cost about $450,000.

DEER HARBOR, WASH.—Orcas Light & Power Company, Deer Harbor, H. T. Cayou, president, will take bids soon for primary and secondary lines for rural electrification in vicinity of Deer Harbor and Friday Harbor, totaling about 50 miles, with outdoor power substation and service facilities. Also for electric generating station, using Diesel engine-generator unit and accessories, for power supply for lines. T. C. Smith, R. D. No. 7, Gregory Heights, Seattle, Wash., is consulting engineer.

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Rate Cut Request Denied

Massachusetts Public Utilities Commission has dismissed a petition of 25 customers of the Manchester Electric Company for lower electric rates. The finding of the commission pointed out a decrease in the number of customers from 11,035 in September to 832 in December due to the large summer colony served by the company. A voluntary reduction was made by the company in January, amounting to $4,000. The commission decided a reduction not warranted at this time.

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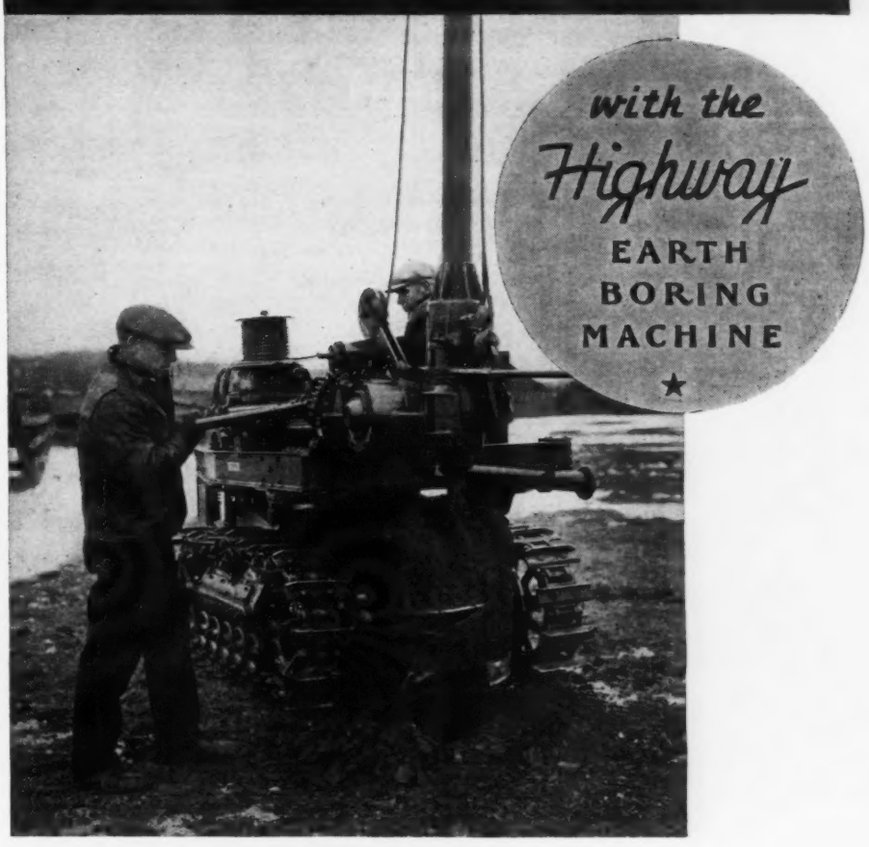

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General Cable Corp., New York, N. Y.
General Electric Co., Schenectady, N. Y.
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Okonite-Callender Cable Co., Passaic, N. J.
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Metropolitan Device Corp., Brooklyn, N. Y.

CABLE END BELLS
G & W Elec. Specialty Co., Chicago, Ill.
General Electric Co., Schenectady, N. Y.

CABLE GRIPS
Kearney Corp. James R., St. Louis, Mo.
Kellems Products, Inc., New York, N. Y.

CAPACITORS
Acme Wire Co., New Haven, Conn.
Cornell-Dubilier Corp., So. Plainfield, N. J.
General Electric Co., Schenectady, N. Y.
National Elec. Condenser Co., New Haven
Products Protection Corp., New Haven, Conn.
Westinghouse E. & M. Co., E. Pittsburgh, Pa.

CASTINGS, BERYLLIUM COPPER
Beryllium Corp. of Pa., Reading, Pa.

CHOKE COILS
American Transformer Co., Newark, N. J.
General Electric Co., Schenectady, N. Y.
Kearney Corp. James R., St. Louis, Mo.

CIRCUIT BREAKERS, OIL AND AIR
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
General Electric Co., Schenectady, N. Y.
I-T-E Circuit Breaker Co., Philadelphia, Pa.
Pacific Elec. Mfg. Corp., San Francisco, Cal.
Roller-Smith Co., New York, N. Y.
Square D Company, Detroit, Mich.
Westinghouse E. & M. Co., E. Pittsburgh, Pa.

CIRCUIT BREAKERS, THERMAL
I-T-E Circuit Breaker Co., Philadelphia, Pa.

CLAMPS, GUY
Hubbard & Co., Pittsburgh, Pa.
Kearney Corp., James R., St. Louis, Mo.
Oliver Iron & Steel Corp., Pittsburgh, Pa.
Scully Steel Products Co., Chicago, Ill.

CLAMPS, SERVICE CABLE
Kearney Corp. James R., St. Louis, Mo.
Reliable Electric Co., Chicago, Ill.

COILS, MAGNET WIRE WOUND
Acme Wire Co., New Haven, Conn.
Anaconda Wire & Cable Co., New York, N. Y.

COMMUTATORS
Cameron Elect'l Mfg. Co., Ansonia, Conn.

COMMUTATOR RESURFACERS
Ideal Commutator Dresser Co., Sycamore, Ill.

CONDENSERS, STEAM
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Ingersoll-Rand Co., New York, N. Y.
Westinghouse E. & M. Co., E. Pittsburgh, Pa.
Worthington Pump & Mchy. Corp., Harrison, N. J.

CONDENSER TUBES
American Brass Co., Waterbury, Conn.
Scully Steel Products Co., Chicago, Ill.
Wolverine Tube Co., Detroit, Mich.

CONDUCTORS, COPPERWELD-COPPER
Anaconda Wire & Cable Co., New York, N. Y.
Copperweld Steel Co., Glassport, Pa.
General Cable Corp., New York, N. Y.
Kennecott Wire & Cable Co., Phillipsdale, R.I.
Phelps Dodge Copper Prods. Corp., New York

CONDUIT, ASBESTOS-CEMENT
Johns-Manville Corp., New York, N. Y.

CONDUIT, FIBRE
Brown Company, Portland, Maine
Fibre Conduit Co., Orangeburg, N. Y.
General Electric Co., Bridgeport, Conn.
Graybar Electric Co., New York, N. Y.
Line Material Co., South Milwaukee, Wis.
Westinghouse Electric Supply Co., New York, N. Y.

CONDUIT, METALLIC
American Brass Co., Waterbury, Conn.
General Electric Co., Bridgeport, Conn.
Graybar Electric Co., New York, N. Y.
National Electric Products Corp., Pittsburgh, Pa.

CONNECTORS, SOLDERLESS
Burndy Engineering Co., New York, N. Y.
Electrical Engrs. Eqpt. Co., Melrose Park, Ill.
Electroline Company, Chicago, Ill.
Fargo Mfg. Co., Poughkeepsie, N. Y.
General Electric Co., Schenectady, N. Y.
Ilsco Copper Tube & Products, Inc., Cincinnati
Kearney Corp., James R., St. Louis, Mo.
Line Material Co., South Milwaukee, Wis.
National Elec. Products Corp., Pittsburgh, Pa.
Penn-Union Electric Corp., Erie, Pa.
Railway & Ind. Engrg. Co., Greensburg, Pa.
Reliable Electric Co., Chicago, Ill.
Sherman Mfg. Co., H. B., Battle Creek, Mich.